On a Customised 'Sims' that Buttressed Student Centric Green Pedagogy in the Academy during Corona-Lockdow

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Abstract

The outcomes of an in-house intellectual research carried out that provided the necessary input to customize and make it more worthy of a Student Information Management System (SIMS) developed earlier by an IT firm for the Technical Education Academies, are highlighted here. Each of the modules of this SIM subsequently were so customized to effectively incorporate all those necessary changes which arise from researched conducted to incorporate some of those basic concept of IoT with it. This researchinvolved was pertaining to threading each other all those existing IT systems running within the campus of an Academy. Once completely customized, this SIM was then found to have buttressed in disseminating the student centric green pedagogy in the academy specially during this Covid-19 Pandemic Time.

Keywords: ICT-(Information and communication Technology); e-Governance, ERP-(Enterprise Resources planning; SIM-(Student Information Management); ATE-(Academy of Technology Education); OBE-(Outcome Based Education)

It is not out of the context here for Author to mention that the initial adoption of ICT Advantages in this country was as early as in 1990's when a Paperless Office Automation system namely; 'Mayurpankh' [1] was first found as fruitfully built and introduced at RDE (Engineering), Pune, which is an Institute of DRDO under the dynamic leadership of Dr. APJ Abdul Kalam, the then 'SA to RM', GoI. Along with other scientists, author also had the privilege to have contributed here in creation and also the functioning of this office Automation. It is worth here to mention further that a First International Conference in the year 2003 covering althea available knowledge one-Governance then were to be implemented was organized by IIT Delhi and it had played a leading role in gathering many valuable information needed for subsequently planned e-Governance for this country. IIT Delhi also then compiled all those collected necessary information into two volumes of its proceedings [2] which includes a presentation on the aforesaid paperless automation office 'Mayurpankh'. In the tireless efforts of all Joint Secretary level officers placed in the Ministries of Government of India, various activities and outcomes of their respective Departments/Ministries were then all successfully convergence following the set guidelines of the National e-Governance Plan. Various, but only related technology of the existing ICT were thus successfully deployed for dissemination of online delivery of services to the citizens of this country. Efforts then included to make the full use of internet, personal computer, iPod or mobilipholony etc. and forma suitable IT infrastructure, that also comprised of some suitable middleware to work around the main activities of the services were to be provided under schemes of the GoI. Subsequently it was then observed that several other entrepreneurial institutions also wanted in their enterprise to, not only optimize all their complementary processes using Java and Microsoft Active Server Pages etc, they also had looked forward to put all their initial efforts using appropriate IT tools to digitized completely their all existing records. Following such trends, every individuals, institutions, schools, colleges and government organi-

zations all over the country had actually then started providing the better services and they all have entered successfully into an era of working with ICT [3, 4]. In this ICT era it has been found that proper allocation management of all the available resources with the enterprises then carried out using their own enterprise resource planning "ERP" solutions [5] for example, as shown the in (Fig-1). Convergence of the activities of the enterprises then had also influenced on various Academic Institutions in the country which had then also gone ahead to adopt the paperless Office Automation.

All Paper based record-keeping-systems that were existing in these academic Institutions were all converted into and stored into the electronic form that facilitated information flow once were made available onto their respective portals. Successfully so created and operated their own information portals, it actually promoted e-governance in such institutions where they also started providing an effective vertical and/or horizontal flow of information. The Student Information Management Systems on similar lines of interface to ERPs [6] were then adopted for faster academic development of their students, along with also creating an effective academic and administration management in these academic Institutions. To achieve this goal in the academy, Authors worked on further customizations of some modules of an earlier deployed SIMs as found needed to do so for the further effective use of SIM. In-house research and development work was needed and therefore carried out by IT team of the Academy. One such effort as was necesseciated on some intellectual research work to be carried out effectively that improved the functionality of this SIM is what highlighted here giving the outcomes achieved on customization of each of its modules.
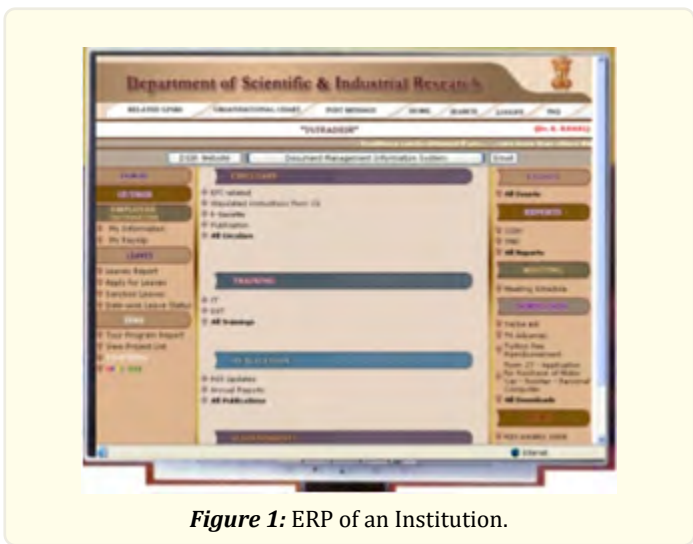

Figure 1: ERP of an Institution.

Figure 2: "SIM" login page screenshot.

Efficacy of the implemented "SIM" [7]

In an Academy of Technical Education, the SIM software (as Figure-2) was implemented which has been chosen here for customization of its various key modules further for example, as needed of HR, Accounts, Results, Attendance, Feedback etc7. Such a students information systems which were developed in the pre-corona era were all designed with complete flexibility to include in future those desired logical and definite routes as well various other useful modules could also either easily be altered or then also be added and integrated into the same SIM as and when they would be required. Some those suggested flexible modules as shown below, were tabulated by the IT firm's team at the begning itself on the use of this "SIM".

individuals persons	*Dash board	*Leave management	Time Table	*Student Performance	*Students Admissions	Library	*Health Center	*Vistors
Students	•	•	•	•	•	•	•	•
*OSD&PA	•	•	•	•	•	•	•	•
*principall	•	•	•	•	•	•	•	•
Faculty & Staff	•	•	•	•	•	•	•	•
Accounts	•	•	•	•	•	•	•	•
Administration	•	•	•	•	•	•	•	•
System Admin	•	•	•	•	•	•	•	•
time table	•	•	•	•	•	•	•	•
Controller of Exams	•	•	•	•	•	•	•	•
*Medical officer	•	•	•	•	•	•	•	•
Security the protection	•	•	•	•	•	•	•	•

* From the use and in-depth study by the author's team of all the above red colored modulus, it was understood that there existed potential customization to further improve all these modulus.

'SIM' Customization as need for its effectiveness

In the Academy of Technical Education where the SIM was in the process of implementation, some necessary changes were visualized as further to be carried out for any conceptual adoption of ToI in this SIM software. Scanning of practically all those already existing paper based records, were first to be digitized as the foremost activity and was then it rollouts out here, clearly as an important no-paper user strategy. It was on an extensive use of such implemented SIM structure made by the authors initially and on closer study, it was also noticed that within the premises there were many IT activities were effective whose functionality may therefore also be combined with this SIM then only one can make an impactful usage of this SIM further in carrying out the student's learning monitoring tasks within this Academy of technical education, and hence some of the core modules of this SIM were customized specially to include these user needs. To do this, first and foremost step involved was that of providing every students and every employee with their login access to their various developed pages accessible from within or outside the campus as shown in (Fig-3).
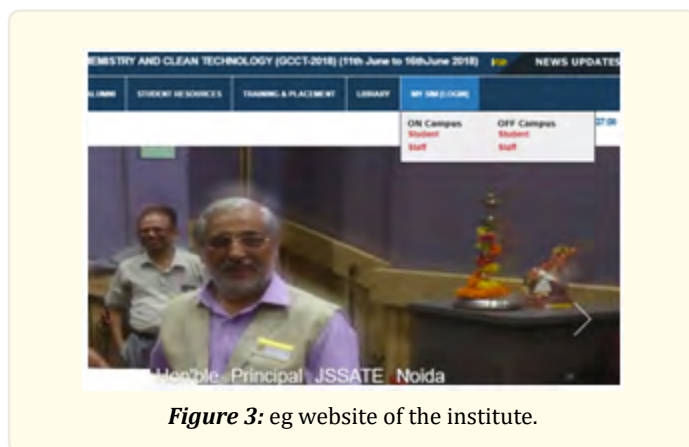
Figure 3: eg website of the institute.

The SIMS for example, as considered here for customization, was basically implemented for the purpose to do all internal works, for example related to teaching and non-teaching staff that disseminate student's performance, bring out effective management and administration of the Institution etc, however, there was a felt need to further make each of its modules more meaningful to the students by only some R&D interventions that could make better functionalities as available online to the users. Once implement at those several out comes of all such interventions, it has become possible to use this SIM to buttress the student centric green pedagogy in the academic Institutions, this fact could be realized specially on its use during the situation of this corona lockdown period. Following are the customized details in same chronological order of those modules which has been earlier described 8. Required improvements that were carrying out through necessary customization efforts were first identified through in-house intellectual research conducted in making them more beneficial to the users.

Employee Module

This "SIMS" enhanced collecting information of the day-to-day work behavior of the users and this became possible only when the Academy could identify each and every person/employee, etc. entering and exiting the campus every day at the entrance Gate itself. The ID cards of every employees and visitors for this purpose, were all fitted with RFID tags that managed their attendance. RFID reading units were all fitted at the gate and at several other locations within the campus. This system was fully integrated with this module of the SIM thus such visitor system installed shared online the RFID data so collected. Further, using this module, all employees when apply for their different types of leave on this system, the leave application utility in this module provided the necessary screens for the approval/rejection etc. to be done by the Academy administrators instantaneously, through this module thereby it, eliminated all ongoing paper based employee leave application and process completely.
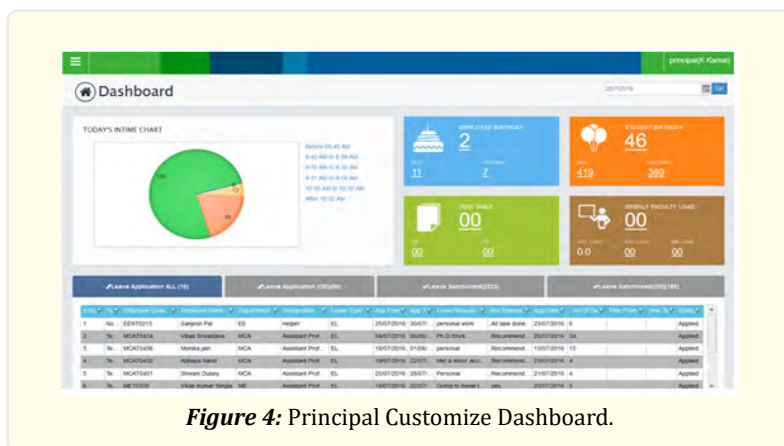

Figure 4: Principal Customize Dashboard.

User Rights Management Module

All those tasks, such as that of a daily Head count of students and teachers present in the campus, as also may other teaching related activities details, were all readily displayed on the newly designed and created dashboards on the daily basis. Provisions were made for assigning approval or disapproval rights by the administrator to that authorized concern staff so as he could grant approval or disapproval only in a single click on his dashboard itself (Figure 4, for example). By displaying the suitable links on their respective dashboards as appears on their login screen, the day to day task, together with other non-learning related activities of students were all got integrated in this module. Soon login, an automatic display also pops up that was in the form of appropriate graphical charts, having differences for each user based on the rights granted to them on their authorized respective dashboards.

Financial Expenditure Management Module

A Financial Expenditure Management System and a Financial Data Portal fully developed earlier separately was in use already for collecting all financial data in the Academy by its Accounts Department. Although data so available could easily be uploaded, the required functional integration task was performed for this module of SIM, however, only due to some mandatory reasons, this data integration was not done during the initial times of SIM implementation in the Academy and this feasible simplified task as can be done with ease, was then left for future.

Student's Fee Payment Management Module

Billing/reports based on the fee paid was generated on this module. To enable the students, teachers and parents/guardians to receive information to pay fee and receive the computerized alerts from time to time regarding any non-recovery of student fee made or on other dues and payments, were all managed by this Module since implemented for effectively use. It became an effective source for the Institute administration, due to possibility so existed on compiling of the aggregated data by them at any time. Along with this, provision was also made to process financial transactions and generates receipt directly from this module. But for making any payment online through internet banking, credit or debit cards, a suitable gateway was to be interfaced with this module that was however could not become effective then due to no identification of any such payment gateway by the Academy.

Inquiry Management Module

In order to save time of its users in digging out the required information, it was felt that the graphical representation of the information must be made available in this module therefore, some suitable templates were first created. After carrying out some required research pertaining to this specific module that provides and manages information on student activities, results, attendance status, course related advices to students and feedbacks from stakeholders, all those templates were customized and made available for example as shown in (Fig-5). Provision were also so made here, as user having no any complications in replying even to inquiries that students would have pertaining to actually raised any strange information.
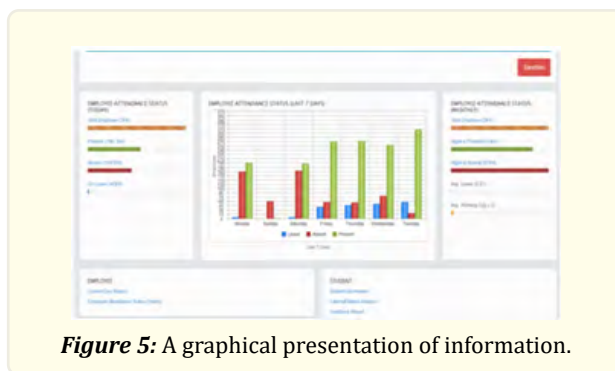

Figure 5: A graphical presentation of information.

Student Information Management Module

Through this module the personal records of each students for example, student photographs, their academic documents as were received before their admission in the academy or any other valuable information (Fig-6) as and when provided for regular uploading from the beginning onwards were all managed here. Any further data, detailing of achievements of the students year wise during their course study in the campus were all uploaded and updated on a regular basis here and were all provided in a seamless interface. Institute campus since considered as the second home of the students where most of the time of the students, faculty, staff spent doing creative works, any solution to track the students hostel and mess related information also at times when needed was found to facilitate better academic performances ince available from this module. Efforts were made to improve the student's creativity in the Academy by making a separate portal called iSIM for their use which was intertwined with the SIM itself, therefore students whose information was once uploaded onto the SIM would also get directly reflected here on the iSIM as well. This interface has turned out of a great help as the students could also access information on their extracurricular activities, read announcements and their performance reports and were also able to apply their leave as well through this iSIM. Health related information of the students could also be gathered here using a medical module created for SIM. Medical check-up of all the students was first done by an on-site doctor during time of their admission to the campus itself and subsequently their medical records then continuously created/updated online in a prescribed suitable format regularly. This medical module so extended the available services of a physician at Student Health Center on a daily basis and which enabled the students to directly know/enter information pertaining to their health issues.

$$Entry\ level = 0.4 \times 10^{th}\ \% + 0.6 \times 12^{th}\ \%$$

Figure 6: Educational Document Information.
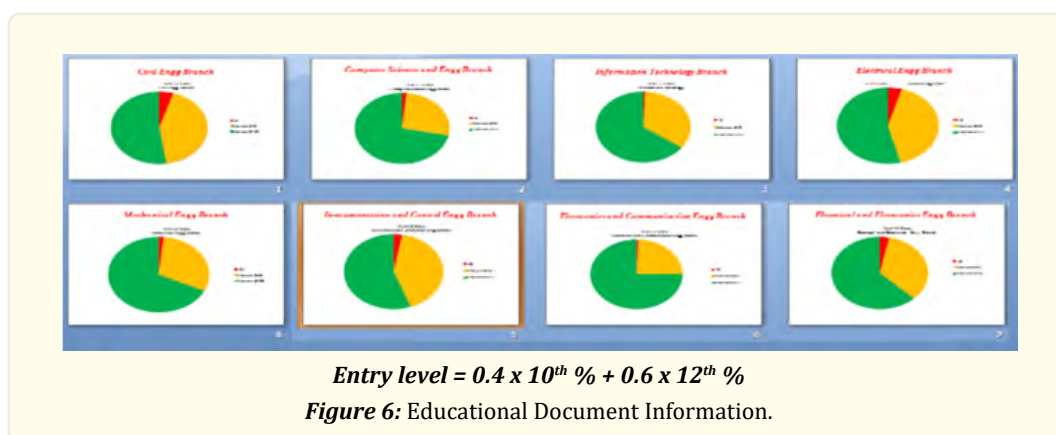
Inventory Module

Any availability or shortage of all those issuable items to the students and staff was displayed by this module since each of those issuable materials and the students' ID cards etc, all have the RFID tags attached to them, whereby it became easy to continuously track them as well. Such required ID cards having RFID tags also were issued on-line through this module at the time of student's entry on the admission day itself. Subsequently, various types of printed certificates to the students, in the already prepared suitable templates with name of each student were also then automatically printed and made available to them on redering some pre-fixed additional charges by the students.

Semester Course/Subject Configuration Modules

It is well known fact that all the students of such Academy are now more computer and internet activities savi. The display on their dash boards, the study material details and various course related subject matters, helped the students on accessing online, the authorized course modules by using their personal login to 'i-SIM' portal from outside or within the campus. With this provision, students were further empowered to acquire complete subject knowledge to achieve their quality goals. Once created the curriculum once

planned for any specific academic year based on the administrative calendar, each faculty of their courses were also able to provide their individual course files as well as their tutorials sheets and quizzes to the students along with those various instructional materials that was needed to for teaching-learning. Course knowledge evaluations of students by teachers were also carried out online from this module.

Student Attendance Management Module

This module have the potential to manage and improve daily activities in the campus as it facilitated continuous monitoring and sending online communications on attendance status of every students, to students, their mentor teachers and to parent/guardian specially via unique color coded display as in (Fig-7, for example). A summary report of student attendance for use by the proctor and by the parent in the PTM for better coordination between the teachers and the parents as was needed become available here that makes the PTM more manageable. All the teaching staff in this academy now go to their class rooms with their laptops and record the students attendance directly into this system accurately. WiFi provided in the entire campus and availability of Laptops to the faculty of the Academy had facilitated such function.
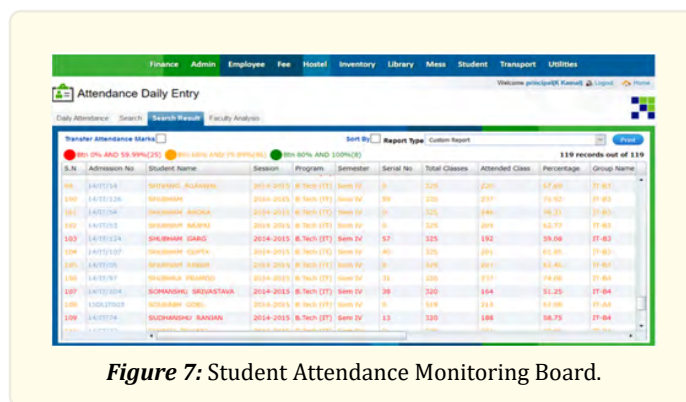

Figure 7: Student Attendance Monitoring Board.

Institutional Centralized Library Module

All the books in the Academy library were first fitted with RFID tags, this RFID system had simplified the maintenance for all the books and that manages the work in this library now more effectively. Once the e-data of the source software system namely 'KOHA', that was implemented separately first was integrated with this module of the SIM and an integrated module for the library of this institute then became fully operational.

Module for SMS Update on Mobile Phones

Initially there was provision to forward the computerized alerts, informing anon-payment of student fee, other dues or even some details pertaining to the inquiry that were raised by students or parents of the students to the teachers. Suitable replies covered by the counselor were then all conveyed by this module. Customized information on the conduct of exams and exam results related information as per the need were also conveyed through automated email content here. Regular updates in the prescribed form of SMS although generated but could then be sent on the mobile phones only on acquiring some specified limit of SMS numbers by the Academy on pre-payment basis to a suitable mobile phone service provider of such push type facilities of SMS.

Student Examination Management Module

Only after making appropriate changes in this module, printouts of each exam conducting details and profile-based generated reports could then be scheduled that included also activities as identification of the hall-wise exam invigilating faculty list etc. All these information as provided were online and through the graphical display, for example in the form of pie charts, which immediately get

displayed respective onto the students and parents of the students dash boards, maintaining an utmost accuracy.

Student Exam Result Declaration Module

In fact the existing core modules of SIMS were on concept, based of an old or traditional test result-based pedagogy, wherein, the students compete only to stay focused on a specific goal of scoring more marks (Fig-8, for example). In this method, which had been in place for a long time in all the Academies, actual subject knowledge assement of the students as was felt, could not be carried out or judged accurately. Therefore, by bringing about a change in this traditional method of teaching, a different education method based on certain newly framed guidelines as widely used now was successfully implemented in this module that clearly demonstrates the knowledge outcome of each of the students on continous basis. That was so needed.
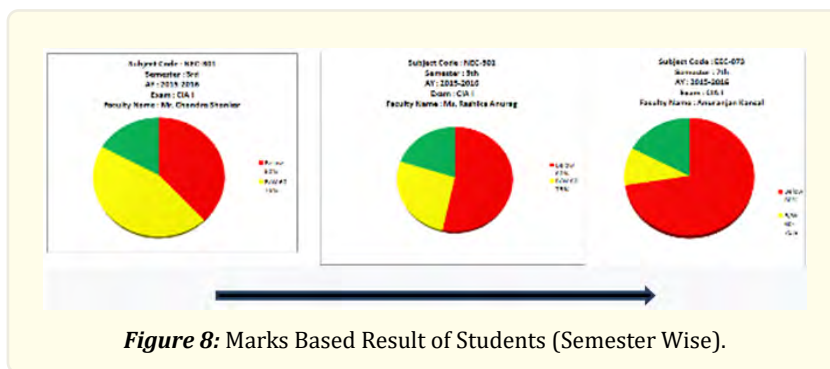

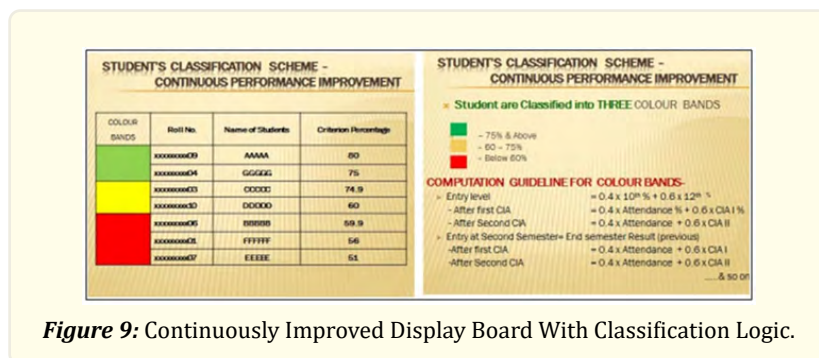*Figure 8:* Marks Based Result of Students (Semester Wise).

Figure 9: Continuously Improved Display Board With Classification Logic.
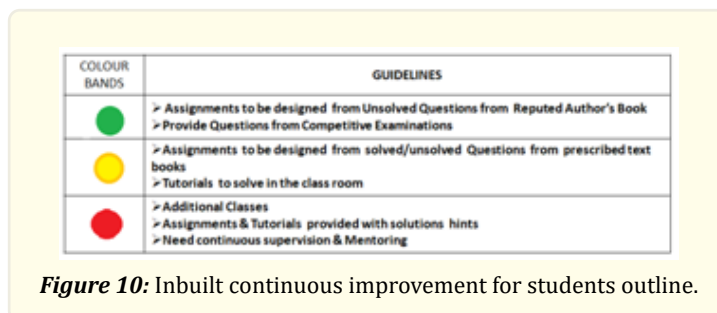

Figure 10: Inbuilt continuous improvement for students outline.

Outcome based education system is now a days, adopted in many educational academies, instead of students passing just by getting good marks in the name of knowledge under result based education. Now high level of education system module can only check the outcome with full real subject knowledge acquired at every level of education by the student that is right from day of their inception to the courses exit. Continuous information was obtained and measured under this module (as in Fig-9 for example) using color coding here grouped based on assement that were provided of students at every level of knowledge, their grading in practical sand then suitably suggesting remedial measures to the students for continuous improvement in their performance. This module on this above concept in the SIM structure (as in Figure 10) was incorporated to comply with those set guidelines for the outcome improvement. The students performance based on a few different but fixed measurement scale thus get continuously depiction/demonstrated to the students by this module now.

Conclusion

At the time when an Academy of Technical Education acquired this Student Information Management System (SIMS), the facilities available in it were only those minimum necessary as required. There was however a felt need of further customization of these modules to provide much more utilities by incorporating almost all the established, complementary processes of any student centric core activity in the Academy. Much of this task could be accomplished only with the help of some in-house intellectual research as was required to carry out in the Academy. Most of those research outcomes were then implemented only to make this as a most efficient SIM in the campus. This could apparently become possible by combining all the available IT equipment functioning now in a way like IoT at the campus. These included RFID tagging, CCTV on entire campus, several RFID reader units, 24x7 WiFi on the campus and also the plastic ID card printers, central information display unit etc. Some of the electronics email and payments gateways etc. also were to be used as completely interfaced with the respective devices. The effective customization outcome that is presented here in this article therefore had enabled the automated working with authorized information without any flow of paper based information on this campus. It not only empowered the staff and students with the necessary subject knowledge and information, it also enabled the students to make use of them effectively for their daily progress and then better perform as being the essential part of implementing 'OBE'. Some specifically customized examples, included here as the continuous display along with the necessary links of their outcome of students performance now made available through featured graphical templates which continuously were displayed on their respective dashboards of the users. The users were also helped with a creative environment for some statistical analytics that facilitates them to improve themselves further. It was visualized that when the necessary changes so carried out in this SIM, it had turned as a medium for student centric green pedagogy dissemination and was seen as had further buttressed it in the academy, factually during the Corona period.

The development team at 'Global Info ways' was subsequently also advised and motivated by JSSATE Noida to further successfully develop and commercialize a separate 'Module of OBE' in future of this SIM. This module however would require implementing all those standard set guidelines and procedures of NBA accreditation along with the complete process and methodologies of OBE in any Academies of Technical Educations.

Acknowledgement

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