**ALL INDIA INSTITUTE OF SPEECH AND HEARING, MYSORE**

 **FORMAT FOR PROJECT REPORT**

**1. Title of the project and ARF project number**

Title of the Project: Design and Development of E-Learning Platform and Faculty Profile System

ARF Project Number: \*\*\*

**2. Principal investigator and co-investigator(s)**

Dr. Shijith Kumar C & Mr. N. Manohar

**3. Implementing institution and other collaborating institutions**

All India Institute of Speech and Hearing, Mysuru

**4. Duration of the project**

24 months

**5. Date of approval / sanction of the project**

\*\*\*

**6. Date of commencement of the project**

\*\*\*

**7. Date of completion of the project**

\*\*\*

**8. Extension of the project term, if any citing references to oms conveying such extension(s)**

\*\*\*

**9. Objectives of the project as approved in the RAC meeting**

The main objectives of the project are to design and develop an e-learning platform and a web-based faculty profile system for the institute using open source tools and techniques. The specific objectives are:

1. To provide an open, flexible and reliable educational technology base for the Institute
2. To create a blended learning environment conducive for both the learners and educators
3. To develop e-learning resources and tools that meet the educational requirements of the Institute
4. To address the need for capacity building in e-learning technologies among the faculty and students
5. To formulate a policy on the adoption and use of e-learning system for the Institute
6. To capture, preserve and disseminate the Institute’s collective scholarly works and transform scholarly communication
7. To create an integrated and dynamic web-based record of scholarly output of the Institute

**10. Remarks received during mid-term review of project progress (copy of the remarks from coordination section with authenticated signature to be enclosed)**

Nil

**11. Modifications of original objectives as approved during midterm review , if any, while implementing the project and reasons thereof (copy of the remarks of mid-term review from coordination section with authenticated signature to be enclosed)**

Nil

**12. Research work flow in detail giving full details of experimental set up, methods adopted, data supported by necessary tables, charts, diagrams, photographs, videos and digitized documents, appendices showing materials developed/adopted in the study, if unpublished, as and when applicable**

**12.1 Introduction**

“E-learning is not the next big thing. It is the now big thing” – Donna J. Abernathy

In most simple terms, e-learning or electronic learning can be described as electronically enabled learning. A technical description will explain e-learning as the process of knowledge acquisition employing electronic technological means, mechanisms, media and mode. It may manifest in the form of virtual generation, online transmission and/or digital management of educational process and products. These process and products in turn may be employed in a wide range of instructional endeavours from rendering supplements to conventional classroom-based instruction to serving as full-fledged substitution to traditional in-person instruction. In the course, e-learning may contribute to teaching-learning process through enriched efficiency, extended access, and enhanced organisation (Clark & Mayer, 2016)(Guri-Rosenblit, 2005)(Ruiz, Mintzer, & Leipzig, 2006). E-learning has evolved over the years turning out diverse implications. However, till recently they were found predominantly effectual with mature learners capable of self-motivated, autonomous learning as in online collegiate, corporative training and adult education among others. Nevertheless e-learning presented immense scope in rendering need-based education to younger school-aged learners as well, especially in meeting differential abilities and diverse needs. But on condition that active adult interaction and supervision was obligatory for ensuring effective implementation. More recently, the advent of COVID pandemic has drawn out its universal, useful application overcoming natural as well as human-made barriers transforming it into the new normal in the general course of education (Ali, 2020; Arkorful & Abaldoo, 2015; Tamm, 2020).

**12.2 E-Learning in Higher Education**

**12.2.1 Premise for employing e-learning in higher education**

Initial forays of e-learning had been extensively adopted and applied in the domain of higher education. Within this sphere, its applications were diverted through two major streams of formal and non-formal education, with the latter in turn comprising distance and open learning courses. The major contribution of e-learning to higher education was in the form of fortifying its effectiveness and extending its flexibility. The fortification of instruction was realised through incorporation of diversity in instructional matter, presentation mode and programme management to become compatible to divergent abilities, interests and needs representing multitude of learners. Its flexibility materialised when such individualised instruction was delivered overcoming barriers of distance/ space, time, quantity/ numbers, and functional limitations in individuals and institutions among others. The ultimate impact was delivery of anytime-anywhere-anybody instruction that is competent, cost-effective and customised (Nguyen et al., 2019; OECD Observer, 2005; Zhanget al., 2011).

**12.2.2 Process of employing e-learning in higher education**

Digital technology is put to assorted use in augmenting quality and quantity in delivering formal and non-formal courses in higher education. Its application in the process of instructional delivery is known as *Computer-Assisted Instruction (CAI)* or *Computer-Assisted Learning (CAL)*. These applications make use of multimedia learning components comprising text, graphics, animations, sounds, speech and/or video to invigorate teaching-learning process by making it interesting and interactive. Such computer assisted instruction can be amalgamated with conventional classroom instruction as supplement to teachers’ input. Or they can also be delivered in the form of interactive materials for individualised self-learning substituting in-person instruction. The supplement or substitute learning courseware can be distributed either through storage devices such as CD-ROMs, flash/pen-drives, etc., or can be downloaded and stored to facilitate *offline learning*. These stored materials could be retrieved and/or reviewed at ease, especially by learners in remote or rural locations where online connectivity is unavailable or unstable. They can also be disseminated to learners outside classroom bounds via wired or wireless internet connections contributing to web-based, *online* *learning*. More frequently analogue and digital elements, and offline and online processes come together to result in composite modes like *blended learning* and *flipped classroom*. Blended learning is complementation of direct instruction delivered by the teacher with e-learning exercises both within and outside classroom. Flipped classrooms employ blended e-learning to provide preparatory experience that precedes teacher’s instruction. When happening online, e-learning can be *synchronous* with real-time interaction between teachers and learners from varied locations, or *asynchronous* with learners accessing recorded instruction hosted by the teachers and responding to it at times and from places convenient to enable *self-paced learning* (Isecke, 2016; Malaker, 2021; Tamm, 2021).

The details ahead describe the different modes of delivering e-learning and their employment in the course of instruction. E-learning can be further categorised with regards to the design employed in catering to learner needs to enable self and/or teacher-directed, learner-centred education. For instance, it could be *fixed e-learning* with uniform content for all learners versus *adaptive e-learning* where the learning content and course is adapted to suit individual learner characteristics; and *linear e-learning* with only one-way flow of instruction to learner as against *interactive e-learning* that facilitates two-way communication with active involvement of learner. Interactive e-learning can further expand to *collaborative learning* facilitating interaction amongst learners as well leading to *social learning* and networking as a contributing educational process. All designs and devices extending *virtual learning* employing *multimedia components* are configured and congregated through *Learning Experience Platforms (LEP/LXP)*(Lawless, 2018; Tamm, 2021).

When digital contrivances are appropriated for holistic organisation of educational programmes beyond mere instructional applications, the process is termed as *Computer Managed Learning (CML)*. This may apply across-the-board, starting from determination of learners and learning targets, continuing through management of learning experiences and learners, to evaluation and resolution of learning outcomes as well as programme efficiency. Originally e-learning was mostly delivered in the form of static webpage content which were passively perused by the learners. Improvisations over time led to additional incorporation of interactive multimedia components, assignments and quizzes. The enhancements in the quality and quantity of instructional transaction were encountered with myriad impediments – as in uninterrupted ongoing interaction between partakers, integration of instructional elements and coordination of related activities over extended time, and accumulation and analysis of pertinent information among others. This led to efforts for developing conglomerate software to manage instructional courses from the commencement of student enrolment to culmination with their evaluation and certification. Such dedicated applications were termed as *Course Management Systems (CMS)*, and later assumed the more pedagogically-oriented title of *Learning Management Systems (*henceforth referred to as *LMS)*.In view of their broad based applicability providing space for interactive user functioning, such software came to be known as platforms. The first such recorded effort was the web-based system of *eCollege* developed at the University of Colorado in the USA to offer online programmes in 1996. Soon it was followed by arrival of other proprietary platforms such as *Blackboard* at Cornell University and *WebCT* in University of British Columbia in 1997. An ensuing major breakthrough was the creation of open source platforms such as *Moodle* in 1999. At present Moodle seems to be the most vastly used platform with around 50,000 institutional users in over 200 countries (Killedar, 2018; Tamm, 2021).

**12.3 Learning Management Systems (LMS) for e-Learning**

**12.3.1 Functions of learning management systems in higher education**

The eventual end result expected from LMS by mundane teachers and learners is facilitation of access, development, integration and delivery of instruction, while enabling management and assessment of learnt knowledge and skills. In the process of realising these end results, LMS assume an all-encompassing role in organisation of instructional courses, extending a wide platform for semi/fully-automated and centralised administration of educational programmes. They are especially viable in higher education programmes involving mature learners capable of self-determination, self-reliance and self-regulation. Such ongoing self-driven systems extend scope for access to self-guided instructional services to wide array of learners, diverse in characteristics and numerous in numbers. Special features of these systems facilitate assembling, integrating and delivering instructional content and components of vast quantity and varied quality. Above all they aid in consistent and consolidated teaching-learning transactions incorporating these constituents over a web-based platform. They further augment these instructional operations with supportive features like mobility, portability, networking and wider access to informational and instructional resources among others. Ultimately resulting in personalised instructional products and individualised learning process for multiple and repeated use with ease by both learners and teachers. Ever growing technological advancements are endeavouring to constantly enhance LMS products and process with features like standardised configuration along with secured access and process. In all, these platforms are potential promoters of both on-ground and online, either stand-alone or blended learning, with necessary paraphernalia for development and dispensation (Ellis, 2009; K-12 Blueprint, 2014; Killedar, 2018).

In order to carry out these diverse functions effectively, LMS offer and operate range of assorted tools. Some of these tools are directly accessed and used by learners, while others are useful to educators involved in teaching instructional courses and/or administering educational programmes. The individual tools may bear different trademark names according to the brand of the platform, but most of their functional purposes are similar in nature. Some of the predominant purposes of the tools can be described in clusters according to their nature(Killedar, 2018), like – *Administration tools* that are employed in setting up courses through authentication of users (administrators/ institutions/ teachers), authorisation of course, registration of students, and similar organisational functions. *Communication tools* facilitating audio/ video conferencing, real time chat, discussions, emails, file access/ exchange, online notes/ journal, jam/ whiteboard tools, etc. These are useful in conducting instructional transactions between teachers and learners, as well as encouraging interaction among the latter and exploration beyond bounds of class. *Student-involvement tools* are an extension of communication tools that contribute to creating student portfolios, clustering and coordinating students for group work, and networking communities of learners/ teachers ongoing development. *Content development tools* come handy to teachers by providing viable templates for instructional design, course structure, and customised web-appearance. They also enable authoring creating and integrating course content with ease and efficiency, especially incorporating accessibility features for the specially-abled. *Course delivery tools* are the next level of tools at the disposal of teachers after creating courses and compiling content for active conduct of the courses. These course management tools help in a range of instructional functions commencing with conduct of students through course materials and coordination of on-ground or online classes. They continue facilitating ongoing monitoring of learning outcomes through posting and receiving assignments, generating test-formats and banks of test-items, conducting tests, setting up rubrics, online correction and marking, and compiling results in gradebooks. Ultimately culminate in prompt certification of learners’ performance along with personalised feedback. In tandem with these primary tools, varied add-ons or plug-ins are offered to enhance functioning with facilities like audio/ video interface, calendar schedule, embedded mail contacts, induction tutorials, etc. (Ellis, 2009; K-12 Blueprint, 2014)**.**

**12.3.2 Availability of learning management systems:**

There are several platform systems for learning management made available to institutions and individuals for conducting instructional courses and organising educational programmes. They may be proprietary or open sourced, and accordingly come at premium charges or free-of-cost. Open source platforms are freely retrievable online and may also allow customised modification by users. On the other hand, there are also platforms available for purchase, which may be installed in-house and maintained by the user. If server and other infrastructure necessary for installation and maintenance are not viable at the users’ end, software-as-a-service (SaaS) purchases facilitate housing and maintenance of the software by the supplier or another third party (Ellis, 2009; K-12 Blueprint, 2014; Killedar, 2018).

Familiar among such platforms are – *Blackboard*, a comprehensive platform that is collaborative in real-time and accommodates mobile applications. Its detailed tools for assessment including test generator, interactive rubrics, built-in reports, etc. are mentionable. *Desire2Learn* is an integrated suite of products for creation, delivery and management of online course incorporating features like mobile application, assessment data, live and on-demand capturing facilities among others. *Edmodo* is free online platform specially focusing on social networking of learners and teachers with facilities for mobile learning, assignments, assessment, etc. *NEO* is another platform with both free and premium offers that facilitates instructional content delivery, calendar, discussion, video conferencing, blog, wiki tools, and assessment tools including online grade book, rubric generator and built-in reports. *Rcampus* is a collaborative as well as intuitive platform for managing instructional content, grade books, assessments including e-Portfolio application, real-time rubric builder with student interaction, progress reporting, etc. *Schoology* is a free platform with tools for media-embedding, online discussions, collaborative sharing of materials and integration of public content, and assessment tools to generate tests, provide direct student feedback, track progress. It also accommodates additional tools to follow and analyse student activity, and engagement with course material (K-12 Blueprint, 2014).

Among these widely known platforms, the two applications currently sought-after and widely-used are *Google Classroom* and *Moodle*. Google Classroom is part of the expansive *G Suite for Education*. It is a customisable setup of classroom or learner groups, facilitating transaction of learning materials and assignments, and conduct and grading of assessments. Besides facilities for setting up a customised classroom with enrolment of students and offering course details and materials, it extends various facilitative features. These include conducting interactive stream, making announcements, posing questions, and creating, conducting, grading and providing feedback on assessment activities like assignments, quizzes, tests, etc. Further, the major highlight of Google Classroom application is its facilitation of synchronous and/or asynchronous instruction with seamless integration with other Google products such as Calendar, Docs, Forms, Mail, Meet, etc. (Bell, 2015; Hurix, 2020; K-12 Blueprint, 2014)

Moodle is an open-source facility offering components in the form of a wide range of activities facilitating interactive delivery of lessons. Its activities for instructional communication and collaborative learning include access to books, chat, database, forum, glossary, media players, repositories, searches, wiki, workshop, etc. They further comprise activities for assessment such as assignments, portfolios, quizzes, questionnaires, reports, gradebooks and certification along with link to external tools like Turnitin plagiarism check. Customised setup and management of courses is facilitated by auxiliary apparatus like activity checklist, attendance, calendars, group formation/ self-selection, etc. The platform permits flexibility for customised combination of these various components and in scaling the size among. It enables teachers to integrate in-built features along with incorporated plug-ins within a modular framework to design customised curriculum for versatile purposes. Such extended use in synchrony with other appliances is facilitated with employment of standardised applications such as Shareable Content Object Reference Model (SCORM) and Learning Tool Interoperability (LTI) (Hurix, 2020; K-12 Blueprint, 2014; University of Massachusetts Amherst, 2021).

Google Classroom is entirely a cloud-based application while Moodle involves both in-premises as well as cloud-based deployment. Google Classroom is advantageous in its ease of use with basic essential features and further need-based access to other Google products, while being limited in technical supports offered to its users. Moodle is meritorious in terms of its comprehensive features and customisable design, while being limited in its capacity for student intake in comparison to Google Classroom (Hurix, 2020).

**12.4 Research Evidence on Utility of Learning Management Systems**

**12.4.1 General trends and issues**

In the new millennium, e-learning and installation of LMS for their execution have become a crucial requirement for advantageous conduct of higher education courses. Especially in advanced countries like the USA, 99% of the higher education institutes are reported to have installed LMS for the purpose of coordinating both conventional and e-learning programmes, and 85% of their faculty and 83% of the students are benefiting from the provisions. Among the teachers 74% opine that it is a valuable tool enhancing quality of instruction; while 56% of students report that these platforms are uniformly utilised in all courses (Brown et al., 2015; Rhode et al., 2017).

Though the utility of LMS rose to prominence with arrival of e-learning mode, their scope for application extends beyond digital or distance learning to conventional educational courses/ programmes/ institutions. They could serve as a potential tool for comprehensive management, especially in programmes involving large number of students. They are useful in managing administrative matters, creating and increasing accessibility to course content/ materials, enriching instructional transactions and teacher/ peer interactions, and extending scope of learning beyond classrooms to practical problem-solving and progressive learning (Govender & Govender, 2010).

Further, specific platforms like the Blackboard, Moodle, etc. have drawn interest of both educational and technological researchers to carry out focused investigation of their efficacy (Moonsamy & Govender, 2018). Focusing on researches in the Asia-Pacific region, Turnbull and associates had surveyed the various designs and method adopted in investigating the use of LMS. The researches in the Asian countries like China were mostly confirmatory in nature, verifying existing notions and theories. On the other hand countries of the pacific region such as Australia undertook more of exploratory researches into new forays and possibilities. They observe that overall emphasis is on drawing empirical data and proof identifying and quantifying variables involved in LMS installation and implementation. And suggest need for more qualitative investigations that look into the nature of the contributions of these variables and both their subjective and objective impact. These will facilitate further constructive development of designs and advantageous use (Turnbull et al., 2021).

Whereas, in the north-western expanse of the globe, researches have been more reflective and proactive in nature looking into the existing gaps in execution, while devising plans for advanced functioning. Malcolm Brown, Joanne Dehoney and Nancy Millichap from EDUCAUSE, an USA-based not-for-profit organisation working for advancing the cause of higher education through employment of information technology, had embarked upon an exploratory research in collaboration with Bill and Melinda Gates Foundation ahead of 2015. In the process they had consulted leaders of 70 educational communities about capabilities of digital learning environments in meeting changing needs of higher education. Consequently, they identified major e-learning features that endorse and enhance these ventures. Most important is the interoperable ability of computer systems and software to interact and work in collaboration with other parallel and distributed mechanisms. Next most important is the viability of customising them according to the circumstances and needs of individual and institutional users. The other functional features that are facilitative are ease of accessibility, comprehensive and contiguous conduct of teaching-learning-assessment procedures, analytical potentials and feasibility of universal design among others. They also reflect that a single application may not be able to deliver all these goods and services. Hence, requiring a ‘lego’ approach involving combinations and permutations of diverse applications for successful smooth progress into a next generation digital learning environment (NGDLE) (Brown et al., 2015).

**12.4.2 Moodle application as a learning managing system**

Moodle, that is Modular Object-Oriented Dynamic Learning Environment was created by Martin Dougiamas, with dual expertise in the fields of computer-science and education originally from a university in Perth, Australia. Moodle, which as a whole word in English also means working at one’s convenience and ease, evolved following his frustrating experience in making use of the LMS made available for university faculty for conducting courses. The application was aspired to serve as a competent platform combining the art and science of the fields of education and technology to reach out to the twenty-first century learners with efficient and economical instruction. Started as a software package extending a course management system (CMS) now commonly termed as learning management system (LMS), the purpose was to create a virtual learning environment (VLE) with facilities for learning content and course management which learners could access and use even with minimal browser equipment and internet connectivity. The open source software hosted by Free Software Foundation is offered for free use, download, modification and distribution under the GNU General Public License. The consistent and extensive utilisation of this warrant extends remarkable evidence to the autonomous, need-based, user-centred application of this platform. For example, Moodle in 2005 was offering support through more than 50 language packs including – Arabic, Catalan, Chinese, Czech, Danish, Dutch, English (UK and US versions), Finnish, French, German, Greek, Hungarian, Indonesian, Italian, Japanese, Maori, Norwegian, Polish, Portuguese, Romanian, Russian, Slovak, Spanish, Swedish, Thaiand, Turkish. Within the next decade that is by 2015, its user-cum-developer community is said to have translated it into nearly a hundred and twenty-five odd languages for practical use. Its design and development is led by philosophy of *social constructionist pedagogy*, which in simple terms could be explained as a process stimulating active and interactive learning (Singh, 2015; Williams et al., 2005).

Ngangbam Mohnish Singh (2010) highlights the special features of the software from students’ perspective. In his project report submitted in partial fulfilment of a bachelor’s course in technology, provides a detailed hypothetical survey of the features and functions of Moodle. He describes Moodle as a learning management system that enables designing and creation of a virtual space or platform for enriched interaction, collaboration and experience both on-ground and online. The wide-range of flexible facilities for enrolling and keeping track of student attendance, presenting instruction through multifarious activities and multimedia, accessing extended and extensive resource materials, conducting lively instructional interaction through chat or forums, distributing assignments and projects along with conduct of quizzes with ensuing possibility for objective and transparent assessment endorse Moodle’s popularity and potential prospects.

Jaswinder Singh (2015), in his manual for teachers, reiterates Moodle’s sound basis founded on educational philosophy and bolstered by an active as well as interactive world-wide user community. From teachers’ perspective he highlights how the platform empowers them to create and manage their own course websites supported by various facilitative features for – uploading and sharing instructional materials like syllabus, lecture notes, reading assignments, and articles for students; for extended teaching-learning interaction through chat and forums; and for continuous and comprehensive assessment through assignments, quizzes and record of grades among others.

With reference to its practical evidence of these beneficial applications, Sáiz-Manzanares, Marticorena-Sánchez, Díez-Pastor and García-Osorio (2019) found that intelligent tutoring systems offered by Moodle helped to improve learning outcomes in higher education students. Smart tutoring features incorporated in flipped learning comprised instruction through virtual reality, subsequent access to in-depth explanations and interlinked information through hypermedia, simulated practice designed to reinforce understanding and promote skill-development, guided exercise-based learning for application and generalisation, and ongoing assessment with continuous feedback. Of the total 83 student-participants from a professional undergraduate course in occupational therapy in Spain, 41 students from the experimental group underwent instruction involving these features over Moodle architecture. Subsequently, they had displayed significant development of analytical approach to instructional information, intuitive synthesis of knowledge, competent skills demonstrated with conviction, self-regulatory study skills, reflective learning, and capability for self-evaluation among others. The quasi-experimental experience had evinced an advantage of 60% advancement in their learning over their 42 control group peers. Qualitative feedback from the participants positively reflected upon the flexible and frequent teacher-student interactions, convenient learning schedules, etc.

Shan Jin from Ningbo Da Hong Ying University in Ningbo, China further ascertains Moodle’s effectiveness as an interactive platform in drawing out quality learning not only in higher education, but also high school students. Experimentation with establishment of a high school Moodle platform of information technology, she reports of consequent curriculum implementation, comprehensive assessment and learning outcomes of enhanced quality. She further refers to Moodle provisions at three levels to have made these accomplishments feasible. First are the comprehensive administrative facilitation of site, course and user management. Next come the flexible facilities for accessibility and mundane use including, selection, logging, etc. And last but not the least are the expansive provision of diverse activity modules offered on the platform for conducting/carrying out tasks, chats, forums, assessment, etc. altogether resulting in higher quality learning in students (Jin, 2012)

Carolina Costa, Helena Alvelos, Leonor Teixeira (2012) following a survey among 278 students of University of Aveiro in Portugal report that the potential of Moodle as a comprehensive and versatile tool for managing of learning processes is being under-utilised. Contemporary students’ use predominantly focused on its utility as repository of learning materials, especially textual content slide shows. In the coordinated conduct of various courses, teachers were reported to make use the platform for making announcements to classes in the form of news, and for delivering assignments. The tools that facilitate interactive and collaborative learning like chat, forums and groups were being neglected. Nevertheless, the investigators conclude that motivating orientation among learners and methodical organisation of teacher competency is capable of stimulating involvement with interest among the partakers to make use of other functionalities offered at this platform hosted by their university. These include both regular activities such as chats, forums and quiz/survey, as well as add-ons like bogs, questionnaire, wikis, and video conferencing. (Costa et al., 2012).

In reiteration of Costa and associates’ report of under-utilised facilities of Moodle, Gabriela Carmen Oproiu (2015) from University Politehnica at Bucharest in Romania accounts for limited awareness among the users as the cause behind this lacuna. She opines that although e-learning could not replace conventional face-to-face instruction, it could add to the completeness and continuance of traditional education. Through a survey among 52 students pursuing diverse technological courses at the university using a 12-item questionnaire, she concludes that natural curiosity of technology-related developments kept them aware of the availability of Moodle platform at the university, but did not extend beyond into informed knowledge about it facilities. Reflections following detailed probe based on the questionnaire reveal students’ eagerness to learn more about the utilities especially that would enable their extended interaction with the teacher leading to a congenial learning ambience. She further notes that this in turn will require stimulating and systematic utilisation of the platform by the teachers, with the pre-requisite necessity for fortifying their attitude and aptitude for the same (Oproiu, 2015).

In the event of systematic organisation and optimal utilisation, Moodle enabled e-learning is said to aid in overcoming time, space and other resource limitations of conventional instruction. Along with enriched instructional quality, it is also reported to enhance student ability and autonomy, especially at the levels of higher education. Ultimately resulting in learning outcomes improved in quality and quantity as evinced by Lan Umek, Damijana Keržič, Nina Tomaževič and Aleksander Aristovnik (2015) through a longitudinal survey conducted between 2008 and 2014 at the Faculty of Administration in the University of Ljubljana in Slovenia (Umek et al., 2015).

 **12.5 Advantageous Selection of Learning Management Systems**

The several platform systems in general extend benefits of a centralised learning system for organising e-learning. They offer one stop comprehensive solutions addressing a range of needs of learners as well as teachers enabling anytime-anywhere-anybody teaching-learning with ease. They have added ease and efficiency to development and dissemination of digital instruction. Digitised storage and retrieval of these products help conserve effort, energy, time and other resources at the disposal of the partakers, permitting further investment in improving instructional quality and programme efficiency. Online, ongoing interactive instruction extends scope for maintaining consistent standards in educational service delivery and enabling transparency in its administration. The major limitations encountered in utilising these benefits are lack of digital literacy and expertise among the target groups, and lack of access to technological facilities, unreliable and unstable technical infrastructure and supports. However, the complaints regarding lack of technological expertise among users are progressively being overcome by user-friendly advancement in functionalities (Ellis, 2009; K-12 Blueprint, 2014; Killedar, 2018).

In optimal utilisation of learning management systems taking advantage of their merits while assuaging their demerits, convenient adoption of close at hand facilities may not be of use. Careful selection following comparison between learning management systems and consideration of their compatibility with institutional needs have to carried out. The selection process commences with contemplation of user/institute related aspects such as aspired objectives, budget allocations, existing technical infrastructure and resources, curricular design, instructional schedule, mode of transaction, assessment strategies, and multimedia components/tools employed in the process (K-12 Blueprint, 2014). Learning management systems offered either free or at premium cost have to be thoroughly appraised in terms of availability, accessibility, functions, applications, cost, variety, flexibility, technical supports and other supplier proposals, and their wherewithal to meet the functional requirements of educational course or programme (K-12 Blueprint, 2014; Ellis, 2009).

**12.6 Need for the Research Study**

In contemporary educational scenario, online e-learning operated via learning management systems has become an inevitable requisite for ensuring qualitative, learner-centred conduct of instructional courses focusing on their autonomy, competence, interests, needs, and scope for continuous learning beyond the bounds of classroom. Besides their established advantage of hybrid instruction combined with e-learning over conventional chalk-and-talk methods, their viability has also been proved in encountering unexpected impediments like the contemporary COVID pandemic. Among the several platform systems, Moodle is found to extend facilities and services that enable cost-effective, user-ascertained optimal utilisation (Singh, 2015). However, in India LMS are found to be optimally utilised for the purpose of enhancement of professional capabilities in corporate business rather than for primary, secondary and tertiary educational purposes. A minority of higher education centres and miniscule proportion of schools are reported to use learning platforms to ensure competent, resourceful and economic delivery of well-organised educational services. Though many institutions, especially at the tertiary level, express interest in promoting their use; lacunae in expertise, infrastructure and other resources are found preventing productive and profitable engagements with learning management systems (Zameer & Leema, 2015). It is high time that these issues were resolved for the gainful employment of learning management systems in Indian educational scenario one of the largest in the world with economically viable effectiveness (Sociology Group, n.d.). Such initiatives have to be taken forward by the governments at various levels and their educational agencies. As mentioned afore, explorative and experimental initiatives are viable to generate concrete and conclusive outcomes at the higher educational levels.

The All India Institute of Speech and Hearing (henceforth referred to as AIISH) located in the cultural city of Mysuru in south-Indian state of Karnataka is an autonomous clinical-cum-higher education institute functioning under the aegis of the Ministry of Health and Family Welfare, Government of India. It is the apex organisation at the national level spearheading rehabilitation for communication disorders through its programmes for academic training, research and development of model clinical services and public education. It is a pioneer in the field not only in the country, but in the entire south-Asian region. Especially, its academic programmes have been the trendsetting prototypes for establishing national standards and replication of programmes in the region. As of the academic year 2021-22, the institute offers three post-secondary diploma programmes, two bachelor programmes leading to graduate degrees, five post-graduate diploma programmes, three master programmes leading to post-graduate degrees, doctoral programmes in five disciplines apart from post-doctoral fellowship. The generation of human resources span the core fields of audiology and speech-language pathology along with allied fields like special educational and technology with a maximum capacity for student intake being a hundred short of one thousand. This substantial strength of students of whom nearly 15% receive instruction through quasi-distance mode programmes that are located in satellite centres in medical institutions around the country are served by an efficient cadre of more than 50 faculty members from diverse disciplines such as audiology, bio-statistics clinical psychology, electronics, linguistics, special education, speech-language sciences, speech-language pathology, otorhinolaryngology, apart from visiting faculty from other academic disciplines. With conduct of academic programmes of imperative value, intense content and structure and import value; it is crucial that a learning management system is set in place to streamline their systematic conduct and ensure consistent efficiency of their accomplishments.

With realisation of the above imminent needs, the reported project was undertaken with the purpose of designing and developing an e-learning platform and creating faculty profile system encompassing the academic programmes at AIISH. This main purpose was supplemented with the specific objectives of –

* Providing an open, flexible and reliable educational technology base for the AIISH;
* Creating a blended learning environment conducive for both the students and educators;
* Developing e-learning resources and tools that meet the educational requirements of AIISH;
* Addressing needs for capacity building in e-learning technologies among the faculty and students;
* Formulating policy for the adoption and use of e-learning system at AIISH;
* Capturing, preserving and disseminating collective scholarly works available/ generated at AIISH and transform them into scholarly communication; and
* Ultimately creating an integrated and dynamic web-based record of scholarly output of AIISH.

**12. 7 Method**

**12.7.1 Research Design**

The research project involved a constructive experimental research design, which involved setting up two soft infrastructures for facilitating execution of e-learning as part of academic programmes at AIISH and verifying their efficacy. Its execution involved investigating the impact of the induction into e-learning process through these infrastructures on the awareness, attitude and ability for conducting instruction through learning management systems among the faculty of AIISH.

**12.7.2 Procedure**

The research was to be conducted through two distinct, parallel courses of execution involving development of e-learning platform and building up of faculty profile system. The flow of work undertaken has been outlined herein under:

* **Course 1: Creation of e-learning platform**

The primary course of action involved setting up of an e-learning platform for all academic training programmes conducted and/or coordinated by AIISH. The sequence of developments involved in the process is as follows:

* **Step 1:** Appropriate software for the development of e-learning platform was selected through a comparative evaluation of the major open source learning management systems including Moodle and ATutor. Criteria like community support, compatibility with the existing instructional support tools like Turnitin, ease of access and facility for uploading of content including completed assignments by the students from off campus locations were considered while evaluating the candidate software applications.
* **Step 2:** Beta installation of the selected learning management software, that is Moodle, on a temporary system with limited computing power was accomplished. Further customization of the software tools as per the requirements of the academic programmes of AIISH was carried out.
* **Step 3:** Component course structures of all the academic programmes conducted at AIISH were ensconced in the Moodle platform.
* **Step 4:** Two pilot trial executions were undertaken to check with the feasibility features and facilities of the Moodle learning management system, as well as features plugged in to further augment its efficacy like the BigBlueButton (henceforth referred to as BBB) application for video conferencing.
* **Step 5:** The customised configuration of Moodle learning management system for use at AIISH was finalised by setting it up on a permanent server and integrating the software with the existing system.
* **Step 6:** A detailed multi-module manual was developed for induction training of faculty and students of AIISH for accessing and utilising Moodle facilities for learning management.
* **Step 7:** The concluding step of training of faculty members in execution of instruction on Moodle platform with hands-on sessions and one-on-one consultation is pending as the process of research execution was hindered with the advent of COVID pandemic.
* **Course 2: Creation of faculty profile system**
* **Step 1:** Appropriate software was selected for the development of faculty profile system through a comparative evaluation of the features of major open source learning management systems including VIVO, Opus and BibApp.
* **Step 2:** Beta installation of the selected software on a temporary system with limited computing power was carried out.
* **Step 3:** Software application was customized as per the requirement of AIISH.
* **Step 4:** Information on faculty publication, funded research projects, classes taught and other scholarly activities were collected through questionnaire and entered into the system developed.
* **Step 5:** Additional profile information from authoritative institutional data sources like digital repository and external sources were imported.
* **Step 6:** Trial run of the system was carried out.
* **Step 7:** Final institution of the system on a permanent server failed due to lack of adequate and appropriate infrastructure backing. Continued efforts shall be undertaken post-research period to install it through Information and Library Network (INFLIBNET), an autonomous inter-university facility instituted by the University Grants Commission (UGC) extending access to e- resources and internet to facilitate higher education programmes making use of UGC-Infonet connectivity programme.

**12.7. 3 Participants**

With the execution of core experimentation with around 50 faculty of the institute still pending, as mentioned afore in description of research procedure, a pilot trial was undertaken. The purpose was to field test the feasibility and functional hassles in carrying out instruction through Moodle platform. The comprehensive trial involved a pre-post experimental exercise encompassing all core features of Moodle platform. The participants for the exploratory trial were identified through convenient sampling from the academic courses conducted at AIISH. The selection criteria were that they should be fulltime pursuers of any course of a regular academic programme at AIISH. They should be willing to participate in the exercise without any coercion or compulsion, and without expecting any incentive or recompense.

Thirteen students of the B.Ed.Spl.Ed. (HI) programme 2019-21 batch along with a coordinating special education faculty participated in the process. The batch comprised 2 male and 11 male students, all of whom were adults of 20 years of age and above. They came with basic prequalification of graduation, and in addition two of them were trained teachers. Their participation was through two phases, one as part of a theory course in the first semester and another as part of practical training in the fourth and final semester. Apart from involvement of these staff and student-participants in the methodical trial experiment, 60 students of M.Sc. programme in speech-language pathology (SLP) were also involved in a one-time trial exposure to a plugged-in video conferencing facility.

*Figure 1*. Profile of student-participants.

In all, 73 students were involved in the trial pilot study. Of whom 18% were graduate student-teachers who underwent experimental exposure to all core features and essential add-on facilities of Moodle platform. Their systematic participation was organised during the opening and closing semesters across the two-year academic programme of B.Ed.Spl.Ed. (HI) involving one theory and one practicum course, respectively. The rest of 82% of student-participants were post-graduate trainee-clinicians who were involved in a one-time exposure to a plugged-in video conferencing facility to check with its viability for large-group instruction.

**12.7.4 Tools and Materials**

The process of research involved development of three diverse types of materials and/or tools comprising seven individual components on whole the as outlined in the Figure 2.

*Figure 2*. Materials and tools developed.

* **Configuration of customised software**

The mainstay products evolved through the research project were two open-sourced software that were customised for use at AIISH. One was a Moodle platform that was hosted in a permanent server at the institute accommodating 45 theory courses at diploma, graduate and post-graduate levels in the disciplines of audiology, speech-language pathology and special education. The platform included around 15(?) standard activities of Moodle as well as need-based applications that were plugged-in (to verify and complete description?).

The other involved construction of the framework of the faculty profile system that was ready for beta installation (to verify and detailed description?).

* **Development of training materials**

The next important products were training materials were of two distinct nature. The primary one was a detailed training manual for faculty with descriptive instruction in the nuances of using Moodle platform. It comprised of (\*\*\*?) explaining the core features of Moodle such as assignment, ... Each module adopted a uniform structure that commenced with an introductory description of the focused feature and continuing with a practical step-wise depiction of the process of using it, and concluding with highlights of the salient features. (to verify and complete description?) .

Further for the purpose of the experimental exposure involving B.Ed.Spl.Ed. (HI) student-participants course materials for comprehensive theoretical instruction and practical training had been prepared. The materials for imparting theoretical knowledge as part of their involvement in the first semester included ten presentations covering 50% of the course content, that is, two units from the entire syllabus. These presentations were either in the form of illustrated webpage content or PowerPoint slideshows. Each entity of instructional material were further appended with assignments involving application exercises and links to additional informational resources. The theoretical information were interspersed with two quizzes administered as formative assessment measures which shall be described in detail as tools for data collection in the next sub-section.

The material for practical training was in the form of a nine-step activity plan concerning pedagogy of teaching English to high school students. The exercise was carried through two sessions of two and one hour each, during which different component applications of the BBB video-conferencing plug-in were experimented with. They included video-audio interface, embedded slide show, shared whiteboard, poll, sharing of notes and links to external resources, break room activities and feedback.

* **Construction of tools for data collection**

Ahead of the impending training programme for faculty-participants and as part of the trial experiment with Moodle platform involving student-participants four major sets of tools were constructed to collect and compile feedback information.

**Feedback questionnaire for faculty-participants:** To begin with, the faculty feedback questionnaire was constructed aiming for all-embracing structure with elaborate constituents that provided comprehensive information about the impact of orientation in use of Moodle platform on the instructional practices of multidisciplinary faculty at AIISH. It had five major sections covering attributes, knowledge, attitudes, competence and prior experience relevant to e-learning among the faculty-participants. The tool opens with an introductory section of seven items for compiling qualitative details about demographic and professional attributes of the faculty-participants. The next core section includes a 10-item multiple choice test on their knowledge about e-learning exercises. Each correct answer shall be awarded a score of 1 while incorrect or no responses will receive 0 score. Performance scores resulting on this test can range from a maximum of 10 to a minimum of 0. According to prevailing pedagogic assumptions and notions score of 70% and above could be considered to imply adequacy in knowledge in a specified field.

The third section is an attitudinal rating scale with 13 statements about facilities and feasibility of e-learning being marked on Likert’s five point rating scale extending from strong agreement to strong disagreement. The responses are scaled from a maximum of 5 to a minimum of 1 for strong agreement to strong disagreement for the five positive opinions and vice-versa for the eight statements with negative tint. Thus, the faculty-participants have scope of scoring a maximum of 65 to a minimum of 5 in this section. As the two scales on the higher end out of the total five imply positive opinion, percentage-scores ranging from 60% to 100% may imply high and/or positive attitudes. The two lower-end scales represented by 0% to 40% percentage-scores may reveal low or negative mindsets. The in-between scale ranging from 40% to 60% may reflect indifferent or undecided attitude.

The fourth section comprises a competency checklist of 10 essential skills necessary to carry out e-learning exercises. The faculty-participants are expected to self-assess on a 3-point grading of highly competent, partly competent and incompetent awarded scores of 2, 1 and 0, respectively. The maximum possible score in this section is 30 with a minimum of 0. Percentage-scores ranging from 67% to 100% may signify appreciable competence, while scores between 33% and 67% stand for mediocre competence and scores less than 33% suggest lack of competence.

The fifth section specifically focussed on the faculty-participants prior experience in using specific e-learning tools that are vital for working on Moodle platform. Nine essential types of tool-sets with a total of 46 applications currently offering them for use were listed seeking qualitative reflections from the faculty-participants in terms of their extent of awareness about them and their experience in employing them gainfully. The questionnaire in its entirety shall be used as a pre-test tool at the commencement of the orientation programme to be conducted to faculty-participants. The four core sections avoiding redundancy of introductory demographic and professional details shall be used as post-test tools at the culmination of the orientation programme.

**Feedback questionnaire for student-participants:** As described afore, trial experiment with Moodle platform involving student-participants included two phases. The first phase engaged them with theoretical instruction in the first semester making use of all core activities of the platform. The second phase imparted practical training in the final fourth semester via the plugged in BBB facility for video conferencing. Qualitative feedback was sought from the students at the end of each of these exercises. Two distinct questionnaires had been developed for the purpose and distributed online via the Google Form application.

The first form seeking feedback on student-participants’ experience of undergoing theoretical instruction over Moodle platform had a total of 20 statements reflecting on the ease of access and use, instructional utility and interactive facilities among others. The student participants had to respond expressing their agreement or disagreement with the claim. The second form despatched subsequent to practical training n consisted of 24-items which were predominantly choice items like multiple choice and checkbox grid, except two items related to student identity. Among the rest of the 22 items, three were regarding the devices and connectivity streams at the disposal of student-participants. Eight items each enquired about the general functionality and specific special features of the application; while two queries were on facilitation of instruction and interaction as part of the practical training.

**Formative assessment of student-participants:** This included two quiz items incorporated as ongoing assessment of theoretical instruction rendered to students during their trial experiment during their first semester tenure. Each of the quiz consisted of five multiple choice items covering content of just concluded unit of instruction. Each correct response was awarded a score of 1 while incorrect or no responses were scored 0, thus with scope for maximum score 5 to a minimum of 0.

**12.7.5 Data Collection, Compilation and Analysis**

The data from student-participants were collected through individual distribution of e-questionnaires. The responses were compiled on Excel spreadsheets that come with Microsoft package of office applications. Consequently, the qualitative feedback about the theoretical and practical instructional experiences was subjected to descriptive analysis. The quantitative measurement of performance in formative assessment as part of theoretical instruction was subjected to inferential treatment. These statistical analyses were carried out through statistical tools Excel application as well as authentic statistical calculators available online, results of which have been presented and discussed in the ensuing section.

**13. Detailed analysis of results indicating contributions made towards enhancing the status of knowledge in the subject**

**13.1 Formulation of Research Hypotheses**

The two core purposes of the research project led to conception of two sets of hypotheses concerning –

1. The learning management system platform offered by Moodle is –

(i) Viable for installation, access and use at AIISH.

(ii) Effectual in facilitating academic instruction at AIISH.

2. The proposed setting up of web-based faculty profile system is –

(i) Feasible with facilities at AIISH.

(ii) Useful in promoting professional efficacy of faculty at AIISH.

(to verify and finalise?)

**13.2 Research Outcomes**

As mentioned afore, the concluding phases of the two courses of project work, namely, induction orientation to faculty in use of Moodle platform and final uploading of faculty profile system were hindered due to inevitable reasons. Primarily, in-campus, in-person unavailability of faculty due advent of the COVID pandemic, and infrastructural inadequacies prevented the fruition of these enterprises.

However, pilot trials subsequent to successful final installation of customised Moodle platform at the server facilities at AIISH rendered useful pointers about the feasibility and utility of the learning management system. As described under the section on method, the pilot ventures were carried out with students from the disciplines of speech and hearing, and special education at the levels of post-graduation and under-graduation, respectively.

**13.2.1 First phase of field trial with M.Sc. (SLP) students**

This exercise involved trial demonstration of online classes on Moodle platform utilising video conferencing facilities over BBB application. The trial session involved 60 students taught by one faculty over duration of one hour. The session was coordinated and observed by the Principal Investigator. Qualitative oral suggestions from the faculty and student-participants for further improvisations and troubleshooting were noted down. The exercise endorsed feasibility of the specified video-conferencing application for large class, synchronised instruction.

**13.2.2 Second field trial involving theoretical instruction to B.Ed.Spl.Ed. (HI) students**

The second field trial was detailed experiment involving 13 students of a bachelor course in special education taught in the first semester of the two-year B.Ed.Spl.Ed. (HI) programme. The students were taught in the conventional method during the first half of the course and over the Moodle platform in the concluding half of the course. Both the phases of instruction extended over duration of eight-weeks each covering two units of content of core course of the programme. It was ensured that all core activities of the platform were utilised in the course of opening introduction, progressive instruction, and ongoing as well as concluding assessment. The instructional efficiency in terms of performance of the student-participants in the two modes of instruction was quantitatively compared. Further their perceived satisfaction about the integrated learning management system was qualitatively compiled.

To commence with the empirical data sets in the form of student-participants’ performance scores were subjected to test for normality. As both the pre and post-intervention scores were found to be normally distributed, parametric statistical measures such as paired samples t-test for measuring pre and post-test variances as well as Pearson product-moment correlation for determining correlation were made use of.

The empirical results derived from comparative analysis of influence of Moodle platform on learning outcomes evinced tentative impressions that –

* Instruction through Moodle platform was effective in advancing learning and performance in the student participants. There was 12% advancement in the performance-scores in comparison to the first stage of conventional instruction (77%) following facilitation of learning through Moodle platform (89%). Subjection to statistical measure of t-test for paired samples endorsed the statistical significance of the advantageous outcome (t = 3.22; p < 0.001).
* The ongoing supplementation of learning through Moodle platform also seemed to sustain a credible and consistent learning pattern among the students with strong and substantial trends of correlation between formative and summative performances (r = 0.98; p < 0.001).

Compilation of qualitative feedback gathered from the student-participants and coordinating staff in the trial theoretical instructional exercise led to the following insights into student-teacher disposition regarding Moodle experience:

* From teacher’s perspective the Moodle platform was advantageous in –
* Easy distribution of learning materials and providing extended access to additional informational resources.
* Timely conduct of ongoing assessment and ensuring dissemination of prompt, personalised feedback.
* Diversifying assignments according to varied ability level and interests of students.
* Providing extended scope for application and generalising learning outside classroom bounds.
* Conserving student-teacher efforts and active instructional time, while also facilitating supplementary time for continuing learning beyond class sessions and space.
* Compilation of student-participants’ feedback collected through e-questionnaires revealed mixed perspectives as gathered from their responses to the questionnaire –
* In the context of instructional transaction, the major advantage (89%) was the access to comprehensive learning material and individualised learning exposure enabled with the aid of Moodle platform.
* However moderate affirmation (50%) of the interest created and addition to workload indicates need for further exploration of diverse prospects of multimedia forays that effectively engage the students without taxing them.
* Student-participants’ satisfaction on evaluation is also not optimal with only 58% assent for prompt and confidential assessment. The reasons being spelt out that assessment accessed out of bounds of classroom permitted misconduct on part of student-participants. Future measures have to be directed to make assessment processes fool and tamper-proof.
* Student-centred features facilitating anytime anywhere learning as well as the possibility for making up for missed classes was endorsed by substantial numbers of student-participants (79%).
* They also highly commended (94%) the extended access to additional information resources and diversity of teaching-learning materials employed via Moodle platform.
* This pilot field trial over a short duration of four weeks does not seem adequately long enough to stimulate sufficient interaction with teacher and among student-participants outside the classroom bounds as implied by the lukewarm responses (38%). In future, focused efforts like initiating forums and organising break rooms will have to be undertaken systematically to make up for the lacunae.
* Deficient technical expertise in student-participants and/or under-provided technological facilities were not deterrents in this trial experiments with Moodle as 83% of the student-participants were satisfactorily provided with both.
* Considerable numbers of student-participants (58%) opined that Moodle could best supplement conventional classroom instruction rather than substitute, especially because of its impersonal nature.
* Through their descriptive remarks student-participants had recommended for fool-proofing assessment exercises, include more active assignments in the form of projects, and provision of alternate resources like printed handouts for students who do not have 24X7 access to ICT facilities.

**13.2.3 Third field trial involving practical training of B.Ed.Spl.Ed. (HI) students**

The third and final field trial involved imparting practical training through BBB video-conferencing application via to the same batch of B.Ed.Spl.Ed. (HI) students who at the time of exercise were placed in the final fourth semester of the academic programme. Following the two sessions of a total three hours, qualitative feedback from the student-participants was obtained. Among the student participants 62.5% were using smart phones connected through internet. The other 37.5% used laptops with either wireless broadband (25%) or wifi dongle connections (12.5%). Substantial numbers among the student-participants found accessing the BBB video-conferencing session easy (62.5%) and quick (37.5%), however few found the process difficult and slow (12.5%) and encountering frequent interruptions (25%).

Concerning the fundamental features of video-conferencing application, that is audio and video interface through BBB, majority of the students were satisfied with the clear and loud-enough audibility (both 62.5%); and stable (62.5%), clear/ precise visibility (50%), well-framed visibility of adequate size (both 25%). The auxiliary use of interactive text facilitated by BBB received overwhelming appreciation with 57% of the student participants finding it easy to access, with readable quality (71.4%) and well contrasted visibility (71.4%). Further 71.4% percent reported that beyond passive reading they were also able to actively create and/or edit content.

Besides the basic facilities, the student-participants were appreciative of the ample special features made available (62.5%) and found them useful (75%) and easy to use (62.5%). Further reflections about the seven such features, namely, chat, emoji, polling, shared notes, video, whiteboard and break out room were also drawn. They found chat and shared whiteboard most useful (both 87.5%) followed by shared notes and video (both 85.7%) and polling (83.3%); while emoji (87.5%) and polling (83.3%) were top competitors in drawing their interest. While most of the facilities were found convenient to access and use, many of them faced difficulty in accessing (57%) and using (71.4%) shared videos; and also participation in break out room activities (62.5%).

Fifty percent of the students found BBB application contributing appreciatively to instructional input and student interaction, while the other 50% found it adequately satisfying. Thirty-seven odd percent found the application easy to operate, the other 62.5% were able to manage without much difficulty. In the process, 12.5% reported contrast situations of either facing no or negligible interruptions, or frequent and frustrating intermissions; while a majority of 75% though occasionally disturbed, were able to able manage with necessary troubleshooting. Ultimately an overwhelming 75% found BBB application very useful, while the rest 25% were fairly satisfied. They student-participants opined that it was a good initiative to make e-learning more viable.

The findings of this study endorse earlier research evidences generated across the globe over the years (Jin, 2012; Sáiz-Manzanares et al., 2019; Umek et al., 2015) regarding the usefulness of Moodle platform in enhancement of teaching exercises and consequent advancement of learning outcomes. However as expressed by researchers like Costa and associates (2012) and Oproius (2015), trial instructional executions through Moodle platform led to the realisation that technical capacity-building among teachers and students was an essential pre-requisite for materialisation of these benefits.

**13.3 Verification of Research Hypotheses**

Empirical findings presented afore led to the following ratification of research hypothesis –

* Hypothesis 1 (i) that learning management system platform offered by Moodle is viable for installation, access and use from the server at AIISH has been practically endorsed through the trial field experiment.
* Hypothesis 1 (ii) that Moodle platform is effectual in facilitating academic instruction at AIISH is accepted following significant advancement in learning outcomes of student-participants.
* Hypothesis 2 (i) regarding feasibility of setting up web-based faculty profile system with facilities available at AIISH is tentatively rejected indicating need for identifying alternate resources.
* Hypothesis 2 (ii) regarding the usefulness of the system in promoting professional efficacy of faculty at AIISH could not be tested due to interruption in its full-fledged installation.

**14. Conclusions summarizing the achievements and indications of scope for future work**

In corroborating with its aims and objectives, the research project work was successful in setting up a versatile online learning platform primarily making use of Moodle open source software along with other add-on applications such as BBB. The platform could sustain around 45 courses at diploma, under-graduate and post-graduate levels. The field trials drew out the viability of the platform for comprehensive instruction and evaluation. They also provided suggestions for making it more robust. The only limitation in realising the objectives was that training of faculty and orientation of students to commence regular implementation of the platform could not be carried out as planned. This was due to inevitable technical issues, as well as the unexpected advent of the COVID pandemic. However, the investigators shall continue with efforts to complete the pending work before the end of academic year 2021-21.

**15. Acknowledgments to funding source, participants and other supports**

\*\*\*

**16. S & T benefits accrued:**

**i. List of research publications with complete details: title of paper, authors, year, name of journal, vol.(no.), page.**

Nil

**ii. Manpower trained on the project**

**a. Research Scientists or Research & b. Other technical personnel trained**

One faculty and 13 students across of B.Ed.Spl.Ed. (HI) programme 2019-21.

**iii. Products developed, if any**

Customised Institutional Learning Management System

Faculty Training Manual on Moodle

Framework for Web-based Faculty Profile System

**iv. Patents taken, if any**

Nil

**v. Institutional/ regional/ national/ international beneficiaries to be clearly indicated**

Fifty faculty from clinical psychology, electronics, ENT, special education, and speech hearing disciplines working at AIISH, and around 900 students of special education, and speech and hearing.

**17. Abstract of the project for inclusion in the annual report /website (300 words, in the following format)**

**i. Objectives:** The reported research project was undertaken for the purpose of designing and developing an e-learning platform and creating faculty profile system encompassing the academic programmes organised in-campus by AIISH.

**ii. Design:** An experimental research for designing and developing e-learning platform along with faculty profile system and ensuing investigation of its impact on student learning outcomes and professional development of faculty was adopted.

**iii. Results:** The findings of the trial pilot experiment found customised installation of learning management system available through open sourced Moodle practically viable. Teacher and student-participants in the process found the core as well as add-on features of the application valuable. Application of blended instruction was able to induce concrete improvements in learning outcomes when compared to conventional classroom instruction.

**iv. Conclusions:** Certain initial targets such as orienting AIISH faculty in accessing and using Moodle regularly in routine instruction and full-fledged hosting of faculty profile system could not be accomplished due to inevitable reasons like lockdown restrictions and technical omissions. Investigators shall endeavour to carry out and complete the same and render Moodle platform and faculty profile system for full-fledged use within the current academic year 2021-22, so as to promote professional empowerment and proficient educational services at AIISH.

**18. Copy of Ethical Committee Report, if any, to be enclosed**

\*\*\*

**19. Plagiarism report to be enclosed**

\*\*\*

# References

Ali, W. (2020). Online and remote learning in higher education institutes: A necessity in light of COVID-19 pandemic. *Studies in Higher Education*, *10*, 16-25.

Arkorful, V., & Abaldoo, N. (2015). The role of e-learning, advantages and disadvantages of its adoption in higher education. *International Journal of Instructional Technology and Distance Learning*, *12*(1), 29-42.

Bell, K. (2015). *The teacher's guide to Google Classroom*. Shakeup Learning, LLC.

Brown, M., Dehoney, J., & Millichap, N. (2015). *The next generation digital learning environment* *(NGDLE)*. EDUCAUSE Learning Initiative.

Brown, M., Dehoney, J., & Millichap, N. (2015). What's next for the LMS? *EDUCAUSE Review*, *July/August 2015*, 40-51.

Clark, R. C., & Mayer, R. E. (2016). *e-Learning and the science of instruction: Proven guidelines for consumers and designers of multimedia instruction* (4th ed.). Wiley.

Costa, C., Alvelos, H., & Teixeira, L. (2012). The use of Moodle e-learning platform: A study in a Portuguese university. *Procedia Technology*, *5*(2012), 334-343.

Ellis, R. K. (2009). *A field guide to learning management systems*. American Society for Training and Development-ASTD .

Govender, I., & Govender, D. W. (2010). An exploratory study: The effectiveness of a learning management system (LMS) in the delivery of a face-to-face programming course [Conference presentation]. *ICETI 2010: The International Conference on Education, Training and Informatics*. Orlando, Florida, the United States of America, 6-9April, 2010.

Guri-Rosenblit, S. (2005). ‘Distance education’ and ‘e-learning’: Not the same thing. *Higher Eductaion*, *49*(4), 467-493. https://doi.org/10.1007/s10734-004-0040-0.

Hurix. (2020, June 29). *Google Classroom or Moodle – Which is the better option for you?* Retrieved September 29, 2021, from Hurix Digital: https://www.hurix.com/google-classroom-moodle-better-option/

Isecke, H. (2016, June 13). *The differences between blended learning and the flipped classroom*. Retrieved September 29, 2021, from LinkedIn: https://www.linkedin.com/pulse/differences-between-blended-learning-flipped-classroom-harriet-isecke

Jin, S. (2012). Design of an online learning platform with Moodle [Conference proceedings]. *7th International Conference on Computer Science and Education - ICCSE 2021*, Melbourne, Australia, 14-17 July, 2012. ThF1.7, pp. 1710-1714. Institute of Electrical and Electronics Engineers–IEEE

K-12 Blueprint. (2014). *Learning Management system (LMS) guide*. Retrieved September 29, 2021, from k12blueprint: https://www.k12blueprint.com/sites/default/files/Learning-Management-System-Guide.pdf

Killedar, M. (2018). Block 4 - Interactive delivery methods: Unit 20 - Learning management systems. In *IGNOU Self Learning Material (SLM) for Staff Training and Research Institute of Distance Education (STRIDE): Master of Arts in Distance Education (MADE)*. Indira Gandhi National Open University–IGNOU.

Lawless, C. (2018, November 29). *The ultimate glossary of e-learning terms*. Retrieved September 29, 2021, from LearnUpon: https://www.learnupon.com/blog/elearning-glossary/

Malaker, A. (2021, June 03). *Online Vs offline education - Advantages and disadvantages*. Retrieved September 20, 2021, from My-India: https://my-india/social-issues/online-vs-offline-education-advantages-and-disadvantages

Moodle. (n.d.). *Activities*. Retrieved October 09, 2021, from Moodle: https://moodle.org/plugins/browse.php?list=category&id=1

Moonsamy, D., & Govender, I. (2018). Use of Blackboard learning management system: An empirical study of staff behavior at a South African university. *Eurasia Journal of Mathematics Science and Technology Education*, *14*(7), 3069-3082.

Nguyen, Q. L., Nguyen, P. T., & Huynh, V. D. (2019). Roles of e-learning in higher education. *Journal of Critical Reviews*, *6*(4), 7-13. http://dx.doi.org/10.22159/jcr.06.04.02.

OECD (. Organisation for Economic Cooperation and Development) Observer. (2005). *Policy Brief: E-learning in tertiary education*–OECD, Secretary-General, OECD Public Affairs and Communications Directorate–Public Affairs Division.

Oproiu, G. C. (2015). A Study about using e-learning platform (Moodle) in university teaching process. *Procedia – Social and Behavioural Sciences*, *180*, 426-432.

Rhode, J., Ritcher, S., Gowen, P., Miller, T., & Cameron, W. (2017). Understanding faculty use of the learning management system. *Online Learning*, *21*(3), 68-86. https://doi.org/10.24059/olj.v%vi%i.1217.

Ruiz, J. G., Mintzer, M. J., & Leipzig, R. M. (2006). The impact of e-learning in medical education. *Academic Medicine*, *81*(3), 207-212.

Sáiz-Manzanares, M. C., Marticorena-Sánchez, R., Díez-Pastor, J. F., García-Osorio, & Ignacio, C. (2019, February 12). Does the use of learning management systems with hypermedia mean improved student learning outcomes? *Frontiers in Psychology*, n. pag., https://doi.org/10.3389/fpsyg.2019.00088.

Singh, J. (2015). *How to use Moodle: Teacher's manual for the world's most popular LMS*. Author.

Singh, N. M. (2010). *Moodle and its features. National Institute of Technology, Electronics and Communication Engineering*. National Institute of Technology (NIT)–Rourkela.

Sociology Group. (n.d.). *The Indian education system: Features, pros, cons and way forward*. Retrieved October 09, 2021, from Sociology Group: https://www.sociologygroup.com/indian-education-system-features-pros-cons/

Tamm, S. (2021, January 21). *Types of e-learning*. Retrieved September 29, 2021, from e-student: https://e-student.org/types-of-e-learning/

Tamm, S. (2020, December 21). *What is e-learning?* Retrieved September 29, 2021, from e-student: https://e-student.org/what-is-e-learning/

Turnbull, D., Chugh, R., & Luck, J. (2021). Learning management systems: A review of the research methodology literature in Australia and China. *International Journal of Research and Method in Education*, *44*(2), 164-178. https://doi.org/10.1080/1743727X.2020.1737002.

Umek, L., Keržič, D., Tomaževič, N., & Aristovnik, A. (2015). Moodle e-learning system and students’ performance in higher education: The case of public administration programmes [Conference proceedings]. *6th International Conference on e-Learning, Belgrade Metropolitan University, 24-25 September, 2015* (pp. 97-104). e-Learning Industry.

University of Massachusetts Amherst. (2021). *Activity types of Moodle*. Retrieved October 09, 2021, from Information Technology: https://www.umass.edu/it/support/moodle/activity-types-moodle

Williams, B. C., Riordan, M., & Dougiamas, M. (2005). *Moodle: For teachers, trainers and administrators* (3rd ed.) In B. C. Williams (Ed.), Vol. V.1.4.3. Free Software Foundation, Inc.

Zameer, G., & Leema, A. (2015). An exploratory analysis of learning management system as an emerging ICT tool in India. *Bonfring International Journal of Industrial Engineering and Management Science*, *5*(2), 95-99. https://doi.org/10.9756/BIJIEMS.8087.

Zhang, J., Ma, J., & Yao, Q. (2011). Application of e-learning in college education [Conference proceedings]. *2011 International Conference on Computer Science and Service System (CSSS)*, Nanjing, China, 27-29 June, 2011, n. pag. https://ieeexplore.ieee.org/document/5974468. https://doi.org/10.1109/CSSS.2011.5974468. IEEE.