TEAL2.0
TECHNOLOGY ENABLED ACTIVE LEARNING

REPORT ON STAKEHOLDERS' REQUIREMENTS FOR A TECHNOLOGY-ENABLED OPEN EDUCATION PLATFORM

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Improving Access to Science and Technology Higher Education in Resource-Poor Institutions through an Open Platform for Technology Enabled Active Learning Environment

CONTENTS

Before commencing the development of a new Technology Enabled Learning Environment in Engineering and Technology studies, the TEAL2.O consortium engaged the platform's potential future users in consultation over the desirable and expected features of the new solution. Considering the impossibility to reach stakeholders in person in the months between March 2000 and October 2000, the consultation took the form of an online survey.

The survey design reflected earlier needs assessment and some already planned preliminary elements of the solution. The TEAL2.O platform is expected to depend on open content and open technology, and to allow for modularity and collaboration among organizations. Modularization was planned with a view to allowing the platform to improve and optimize access to the best Science and Technology learning materials already available in the public domain, and to offer lesson planning and content creation tools that can be used by individual institutions, faculty and students according to their teaching and learning needs. Furthermore, the early assessment indicated that the new solution should also allow for the integration and use of existing open-source software and hardware (e.g. Arduino) with DIY style laboratory experiments, more specifically through the creation of Virtual Laboratories.

The platform is planned to be used in a variety of ways: as a distance learning platform, as a content management platform, as a tool enhancing learning in the classroom or blended learning. Content-wise, the platform will be developed and used in a networked fashion – initially within localized networks of similarly positioned institutions and then slowly expanding as a network. It should be especially beneficial for resource-poor institutions. All of these preliminary design specificities and requirements were put to further test with this survey. In addition, future users were given plenty of opportunity to share their alternative views and to propose creative solutions.

The survey was carried out in the period March-October 2020, with most of the responses received during the summer of 2020. Six types of stakeholders were reached: students, distance education learners, faculty members, university administration, public officials and representatives of

organizations providing non-formal education, civil society groups or local community groups. A total of 2527 responses were received, the great majority of which from students, distance education learners and faculty.

Respondents

Type of user / stakeholder	Total number of responses	Number of different institutions reached
Public officials at local, regional or national level	17	16
Faculty members	157	26
Managers/administrators at universities	65	26
Students	1929	15
Open education/distance education learners	355	n/a
Organizations providing non-formal education, civil society groups or a local community groups	18	16

The attitude of respondents toward the planned platform is overwhelmingly positive. We were specifically interested in determining the attitude toward certain planned features in order to validate (on the basis of a larger-scale assessment) that they are indeed part of the end users' needs. The following results appear as significant and need to be considered by the developer teams:

Requirement	Percentage of users identifying it			
	Students or distance education learners	Faculty	University administration	Public officials
Modular access to a variety of international online resources, making it possible to pick and choose and re-combine different resources to best fit the needs of students	80	69	83	65
Easy and flexible access to international online resources pooled together in one place	87	-	-	-
A strong Quality Assurance framework inbuilt within the environment itself	-	-	-	59
An autonomous auditing and ranking process, involving the users themselves	39	22	31	23
Possibility to use Virtual Labs into training and teaching	77	75	91	76
Possibility for direct teaching collaboration and access to resources from other institutions in our country	76	50	52	41
Possibility for direct teaching collaboration and access to resources from institutions abroad	76	55	54	76
Should allow for flexible learning; learners should be able to choose their own study paths	-	54	57	-
Should promote flexibility at institutional level – the university should be able to adapt it to	-	53	-	47

their needs				
Possibility for learners to design their own learning path	60	-	-	-
Continuous collection of feedback, peer reviews and data about usage	-	48	52	
The system should be flexible and should allow us to respond to feedback and usage statistics by both learners and colleagues	-	42	63	-
Classroom creation and management should be clear and intuitive	-	55		
Intuitive interface, easy to use	65	-	-	-
Easy interaction with other learners and with mentors	71	-	-	-
The system should allow to assess students based on interaction and collaboration, not just results on tests and assignments	-	60	-	-
Special attention to the needs of disadvantaged learners	49	57	68	71
Special help for students with disabilities	45	-	54	-

In addition to these main requirements, it should be noted that stakeholders outside the universities (the online and distance education learners and the representatives of non-formal education providers) identify the easy and flexible access to university resources pooled together in one place as a major requirement.

The results lead to the following conclusions:

Most important requirements

- Modular and flexible access to a variety of online resources is definitely a major requirement.
- Access to Virtual Labs emerges as the other major requirement, suggesting that developer teams need to put a lot of effort into the sophistication of these elements of the solution.

- Intuitive interface, easy to grasp platform functions an easy communication with the participants in the learning process appear to be a must.

Important requirements

- Collaborative aspects of the platform are identified as a requirement by over half of the users and stakeholders. Special attention needs to be paid to making it possible to collaborate across brothers rather than just among institutions within the same country.

- Flexible learning, flexibility to answer to institutional needs and the ability of learners to choose their learning path should remain a requirement, although it appears to be less desired that initially thought.

- While the requirement is not universally mentioned, it appears absolutely necessary that the platform addresses the needs of disadvantaged learners and learners with disability.

- Quality assurance matters a lot to public officials.

Requirements not clearly validated by user feedback

- While undoubtedly greatly innovative from a technical point of view, the development of an autonomous auditing and ranking process involving the users themselves is not immediately identified by users as a major requirement. It could be argued that most users have no appreciation of the benefits of this process due to its novelty. However, this should promote re-examination of the amount of effort that the developer teams put in this task and the degree of sophistication that will be necessary. It also identifies a need for putting efforts into awareness raising and training the users regarding this process.

All in all, the survey supports the preliminary requirements for the TEAL2.O platform. It also reflects the increased interest in online delivery of education in the context of the Covid-19 pandemic. This is both an advantage and a drawback for the project. The advantage is that the platform is becoming even more relevant to all the target groups and the participating institutions. The disadvantage is that many of the collected comments, responses and expectations appear to have been influenced by more immediate short-term requirements about online delivery of education as they emerge in this current situation of confusion, forced online delivery and lack of preparedness. Longer-term considerations for complementing traditional education with a new generation technology-enabled learning platform – specifically for Science and Technology studies – may have been secondary in this situation.

In addition to collecting the requirements of users and stakeholders about specific features of the software solution, the survey also allowed the respondents to freely share comments, expectations, proposals and ideas about features and functionalities of the platform.

A great amount of comments were received, with almost every participant in the survey sharing one or more proposals. The proposals were frequently similar or related. They have been grouped and summarized for the purpose of making them useful in the process of finalizing the requirements for the TEAL2.O platform.

Notably, there were requirements that were mentioned by a great number of users. These frequently recurring comments and requirements should be analyzed very seriously by the project team. They may be the result of current experiences with the delivery of online education under stressful conditions and without a proper period for adjustment and preparation. However, they still represent valuable information for decision-making in the process of developing the platform. For reasons of specificity, responses from students and distance education learners are separated from the responses received from other stakeholders.

Student responses and requirements

Requirements in red – recurring very often

Requirements in blue – recurring often

Requirements in black – recurring occasionally

Requirements in grey – likely unfeasible (require sophisticated equipment and/or a larger budget)

Requirements in green – already addressed by current development plans

Overall approach to the platform development	The platform should be effective and easily accessible in conditions of poor internet connection - minimize heavy content that can slow down loading or consume a lot of data, as students are paying for the internet themselves. Files should be of smaller size. Only the most recent versions should be available.
	Lectures should be available as videos for downloading rather than as live streams. This is in order to enable flexible learning and to address the issue of poor connectivity that a lot of students are struggling with.
	Easy to use and understand User Interface (user-friendly and not too complicated)
	Platform-independent, i.e. should be usable on MacOs, Windows, Android, IOS
	All the features for a course, such as quizzes, video classes, file storage for lecture slides/learning material should be integrated into ONE single platform
	Security of the accounts should be high
	Everyone should be given access to all career and learning paths
	Virtual labs and simulation software should be available online (in the cloud?), avoiding the need for installation on the part of the learner
	Access to (or integration of) OpenCL or Vulkan
	Allow lectures from professors from different universities to be made available to all users of the platform (i.e. no restricted access)
	Allow projects to involve student from different universities, including international students
	Courses should provide certificates in order to motivate learners
	A strong focus on collaboration, especially between different universities

Specific features required by students	Virtual simulations
	Features that make the courses more interactive
	Virtual whiteboard/blackboard
	A feature that enables the platform to send reminders (e.g. via email) before each class, assignment or event, and notifications about missed deadlines.
	A feature enabling groups/teams to work on a project, including a real-time progress log and hosting the project on the server.
	Collaborative research facilities
	Flexible assignment submission
	An integrated system for taking notes
	Users should not maneuver more than 4 times before getting to their final destination.
	Ability to rate and rank resources to save time and create a recommendation system for the future users
	A feature that links studies to career opportunities
	A feature to enable access to licensed software for specific subjects
	A quick tutorial on how to use the online class platform, with Do's and Don'ts
	Possibility for people with unconventional interests to model their own integrative course
	A live camera used during virtual labs
	A discussion forum
	An online exam portal where students can evaluate themselves
	A tool that can recommend a learning path involving the completion of several courses
	A feature that allows additional libraries to be added
	A feature that allows for handling the malicious activities that certain students are capable of - e.g. removing classmates from the class and muting the teacher's microphone (this comment presupposes streaming/live classes)
	Easy screen sharing features (this comment presupposes streaming/live

	classes)
	A log of who has been speaking at what moment (this comment presupposes streaming/live classes)
	Improved procedures for checking attendance (this comment presupposes streaming/live classes)
	A feature allowing users to provide suggestions for improving the platform
	A search option to enable students to learn more about the topic
	For Programming Assignments, provide integration with GitHub Classrooms (GitHub Education)
	A separate section for research work orientation and guidelines. A separate section for research work mentoring and reviewing. A peer review section for research work
	Improved zooming options (this comment appears to presuppose streaming/live classes)
	A section presenting faculty profiles with subject of interest and research
	Easy storage to enable students to collect materials from different sources
	Integration of courses offered by industry (not just academia)
	Structure Audio/Visual into chunks of content (let's say 15min clips) so that students can watch them at their own pace.
	Include encouraging tips/advices, e.g. "70% of the students who completed the course referred to this video more than once".
	Allow students to create their own profile that features information about them and their completed courses
	A calendar for the classes; Google Calendar/iCal integration
	Virtual Lab feature that enables remote access to a tool or an IDE
	A feature to enable surveillance and anti-cheating during exams and tests
	A speech to text feature or live captions during lectures
	For Computer Science and Engineering courses - an online grader for laboratory assignments according to international standards, such as is used by platforms like Udacity and Coursera
	A.I. screen and face detection method to determine if students are

	studying or not
Suggestions about the effectiveness of learning and the courses on the platform (not related to development but to course design and delivery)	There should be a focus on hands-on and practical learning
	For materials creation – consider the good practices such as ocw.mit.edu, nptel and the spoken tutorial method from IIT Bombay
	The teaching platform should attract guest lectures from the industry, so that it could be linked to internships, too
	Every lesson must conclude with an assignment part which should carry a grade.
	Some students want course contents that are focused and concise, others want additional materials. A balance could be found with concise required materials and additional material.
	Step-by-step tutorials for the virtual labs
	Course syllabuses should reflect the requirements and inputs from industry
	Special QA sessions should be organized for slow learners
	Opt for more gamification, CALL and MALL
	Virtual labs should feature step-by-step guidance for different projects on software such as ansys, matlab, catia, autodesk, solidoworks, etc.
	Assessment should be planned and designed in a way that does not hamper the students in case of any connectivity issues. There should be an alternative if any students have connectivity issues during assessments
	FOSS/FLOSS software projects should be used as a teaching medium and assignments should revolve around contributing to those projects or creating such new ones
	Increase the quality (and complexity) but decrease the quantity of the assignments
	Virtual labs should provide also a video of lab sessions or virtual labs should have background Audio recording
	A strong focus on real-life examples
	Time limit for each Class not exceeding 45 minutes
	Offer suggestions or solutions (answers) to failed attempt virtual lab work (questions)
	Evaluation and assessment should be done after each session rather than

	just once at the end
	Establish collaboration with other institutes and organizations for certification from various organizations/institutes like CCNA, CompTia, Ec Council, SANS, ORACLE, AWS, VMware etc.
	An online instructor should be continuously engaged with the course in order to help the learners

Responses and requirements from faculty and other stakeholders

Requirements in red – recurring very often

Requirements in blue – recurring often

Requirements in black – recurring occasionally

Requirements in grey – likely unfeasible (require sophisticated equipment and a larger budget)

Requirements in green – already planned

Customizability	At institutional level: It should allow customizing according to the specific university requirements
	At individual level: It should provide an interaction system and flexibility for learners to choose their own approach to practice
Assessment	It should provide sound criteria for evaluation and assessment of learners; Develop a mechanism by which student evaluation can be meticulous and fault free
	It should provide features enabling teacher feedback to student and student feedback to teachers
Interactivity	Provide tools that allow for interactivity
	Discussion forums in online courses get overflowed too easily. There should be automated way of keeping only the useful ones and remove those which are redundant

Prior training	Students should be aware about how to use the platform before it is launched
	Need to provide proper training to the staff
	Train the top managers to understand and support this trend toward technology-enabled online learning
	Build faculty's capabilities to create online contents that can supplement the curricula
Specific features	Comfortable drawing tools equivalent to whiteboard should be developed
	A good distance learning platform it should allow to conduct labs remotely. Virtual labs will not provide a solution for this, remote access is needed (this requirement may prove unfeasible but is a frequently recurring one)
	It should sustain a high number of user logged in at the same time
	Lectures must not be live and it should be possible to access them at any time
	It should allow for demonstration-based teaching
	A module for working as a team should be provided
	Virtual Labs are the most important feature
	For Labs, work in the cloud will be very welcome
	It should allow for industry collaboration, in situ industry specific virtual examples, applied engineering examples, online training of industry-specific standards, regulations, practices, etc.
	Enable capture and reuse of teaching-learning experiences
	Enable personal learning environments for individual students
	Should have a collection of all published and pre-publication versions of research and working papers published in the domain
	Should enable free access to details of all the patents published and/or filed
	Flexible, modular, structure of courses must be defined
	The platform should give access to many case studies
	Include QA (Questions and Answers) sections or short quizzes,

	videos of success stories to keep learners motivated
	A scoring and ranking mechanism for the users like in Stack Overflow should be introduced. This profile can later be used for evaluation purposes
	Should provide online evaluation procedures that prevent copying and plagiarism
	Tools to track learner progress
	Include a collaboration tool to run and edit simulations
	Allow for an online space to organize discussion with managers from different companies in the researched field
	Enable phone notification in connection with any e-mail or any modification of the platform
	Notifications about availability of new content, tools, resources (e.g.: as a newsletter)
	Allow instructor to import and modify figures and animations
	Integrate Google Classroom and Microsoft Teams; equip the faculty members with needed software such as Kahoot!, podia, ezTalks, articulate, a web whiteboard, Socrative, formative, TurnItIn or UniCheck and Google Classroom; link recognized YouTube educational channels.
	It should cover automatic/semi-automatic descriptive answer assessment and linkage of virtual labs
	Support for non-English speaking students
	Should have a database of all work in progress academic research
	Should be able to glean commercial research pipelines of companies using AI
	Could make use of AR and VR technology
	For Labs, access to a module of augmented reality, virtual manufacturing software like CATIA, SIEMENS is important

Suggestions about the effectiveness of learning and the courses on the platform (not related to development but to course design and delivery)	It should introduce concepts and techniques from Industry 4.0 WebQuest challenges are a good and involving learning methodology which may be considered also in Engineering and Technology studies. Introduce project-based approaches Consult the syllabus with industry
Collaboration	Allow for multi-disciplinary teaching and learning. The integration/cooperation with people from other fields of study is very useful in such an online system. Allow many institutions to be linked to share the resources. Most of the universities do not have all the laboratory facilities to conduct every laboratory experiment. For such cases, it would be very good for students to join an experiment live (virtually) while such experiment is conducted in other universities Join on the platform teachers and graphic design developers An ideal online teaching-learning platform should include a facility to bring all the corresponding stakeholders together (through the platform itself) and make them actively involved in tweaking the course contents according to the current and future requirements of the country Enable peer-to-peer interaction and collaboration
Institutional issues	Accreditation requirements have to be considered Pilot scale analysis needs to be done before implementation
User-friendly interface	If the platform is to grow, it should be simple to use on a large scale
Integration with other platforms / policy issues	A uniform learning management system (customized from an open source LMS) among all state universities of Sri Lanka will be most desirable by all stakeholders and UGC must involve selected experts from all universities to improve the system There are too many platforms already but they are not integrated with Learning Management Systems or Video Conferencing tools. This should be done as soon as possible. We already have the LEARN.org platform. It can be further upgraded and used by all institutions.

Access to learning resources and content	The platform should be mobile-friendly

The survey has investigated several broader issues regarding the design and delivery of online education in order to ensure that the TEAL2.O platform contributes to addressing these wider concerns in the project countries' higher education systems. This has become even more relevant and pressing in the conditions created by the Covid-19 pandemic. Measures to counteract the deterioration in public health have resulted in closing of the universities and forced a stressful migration of studies into online mode. Most universities and individual faculty members have not been sufficiently prepared for the transition. The situation has been seriously compounded by the lack of infrastructure enabling students to access online education, especially in rural areas, as well as by the high cost of internet access.

The survey respondents have identified several issues in distance and online education that are currently most pressing for the three project Partner countries (India, Thailand, Sri Lanka). Below, we identify those issues, specifically differentiating between the ones that the TEAL2.o platform can help address and those that are a matter of broader policy response or actions that need to be taken at different levels of the higher education system. It should be noted that different users appear to envisage different type of online education – one group is thinking about lectures and sessions available as recorded videos and accessible at all times, while others envisage live streaming of learning sessions. Most of the responses make sense only if one or the other is adopted as an approach. All in all, one of the key tasks of the TEAL2.o creators will be to determine the mode of delivery of sessions – recorded or streamed. On this basis, some suggestions may be filtered.

Identified issues in distance education that the TEAL2.o platform could address	Identified issues in distance education that the TEAL2.o platform cannot address
No availability of laboratory/hands-on sessions and virtual labs for practical aspects of engineering Essential tools such as simulation software, experimental setups are expensive There is not enough possibility for live demonstrations	Limited availability of facilities and good equipment for extended learning
Lack of online platforms that facilitate enhanced real-time teacher-student interaction (e.g. limitations of existing platforms in obtaining real-time feedback from a large group of students/several groups of students during a session).	No reliable and fast internet connections to all at an affordable cost
Lack of platforms which provide a complete overview of the module (both for students and	It is necessary to identify and choose the best practices for online teaching

the teacher) after completion of the course. The overview can be like a dashboard consisting of key elements required for making a decision (by the reviewers who can provide a feedback online via the same platform) on whether the teaching-learning process has met the stipulated quality assurance requirements.	
Lack of simple (user-friendly) systems that prompt the students to provide quick feedback about a conducted session as soon as it is completed	It is necessary to develop capacity for delivering online education
Less inter-student interaction and no formal forums that fulfil all needs	It is necessary to develop technical skills and design thinking skills among teachers and learners
Insufficient interaction during the learning and teaching process Most Asian students are less interactive in online platforms Improved teacher/student interaction is necessary A seamless, real-time interface for faculty - student interaction The teacher should be able to receive live feedback from the student	Lack of common platform and standards Similar platforms should be used by all universities. Now we use several different ones.
A really collaborative environment is missing Limitations in disseminating knowledge in a collaborative manner via online platforms Limited possibility for interdisciplinary teaching and learning	Lack of resources
A user-friendly interface is a must	Students encounter frequent technical difficulties in Sri Lanka and Asian countries.
Accessibility (also for socially disadvantaged people) is a must	Ensuring student participation is difficult
Good tools which can be used for video lectures are not free	Ensuring student commitment to the learning process is difficult

Limited availability of setup to record and edit video as well as virtual setup of experiment Lack of device with stylus to conduct online sessions No possibility to interact with students on the same drawing	
Limited availability of teaching resources The teaching materials should be suitable for open and online study and should not be the same as those used for teaching in the classroom.	Access from rural/remote areas is difficult Better access to the distance learners is needed Policies to promote greater equality in access to learning resources for disadvantaged groups within the societies are needed
Limited possibility to have collaboration across borders	Universities should provide extensive help to the students and faculty for the use of online tools
Limited access to open educational resources Need for flexible platforms which enable integration of sections from already developed modules available online.	Change of attitude and approach of the teachers/facilitators regarding the Teaching-Learning Process Removing the fear and/or indifference towards using technology enhanced learning methods in the teaching/learning process. In essence, the most pressing need is a change of culture (that's been in operation for centuries), than providing technology or tools.
Limited possibility to engage in self-paced learning Allowing working people to enhance their knowledge and learn new skills through part time education offered by online learning.	No availability of licensed software tools
Lack of tools for online assessment It is necessary to allow for evaluation of assessments in automated way (including plagiarism detection, teacher configurable assessment rubric, etc.) Limited possibility for individual follow-up of students regarding activity level, learning process, ability to compare each with average of class	Efficient Resource Utilization and Time Management is needed

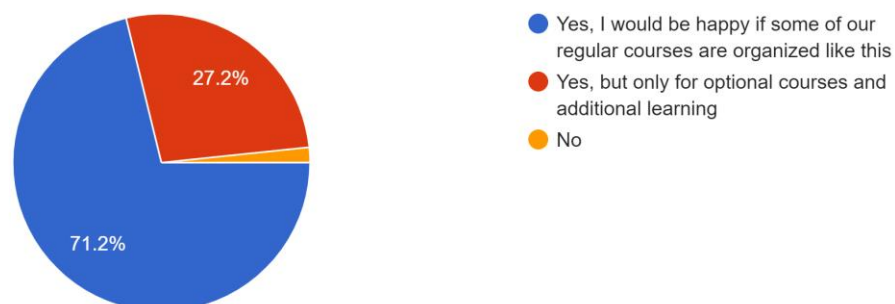|	
Limited tools for performance reviews	
No possibility for sharing multimedia content	The language skills of students should be improved
Lack of tutorials	More focus on practical knowledge
Limited tools for content development	
Limited possibility to draw diagrams and write technical examples – a digital alternative to writing on a blackboard is needed	
It is necessary to find ways to benefit more students with limited resources	
Open access is not available all the time Some contents are closed and not open for all.	
Facilitated literature search is necessary	
Curricula should be designed specifically keeping in mind the constraints of online education	
Lack of organized environment for live streaming and archiving video streams of teaching sessions	
No prior training on how to use online learning platforms effectively	
Online learning should be more student-friendly and there should be more student engagement.	
No best practice examples/templates	
More effort should be put on creation of networks and communities of practice focused on learning	
Not enough qualified teaching staff in remote locations	
It is necessary to promote the adoption of Outcome Based Education	
Innovations are needed in education, such as Collaborative Cooperation Networks, Online Courses (including MOOCs), Open Culture,	

Open Science and the exchange of open educational resources
It is necessary to implement pilot projects related to artificial intelligence and learning analytics through open education.
Limited access to databases and research infrastructure
Effective quality assurance focused on learning outcomes
To reduce information and knowledge asymmetry
Content is not regularly updated

Finally, it should be noted that stakeholders identify the training and qualification of teaching and support staff as the most urgent area where improvement is necessary in online and distance education. This leads to the conclusion that, in addition to the requirements of the platform itself, the TEAL2.o consortium needs to carefully plan extensive and effective training actions to support staff, as well as students, in using the developed platform.

Expectations from a new Technology Enabled Learning Environment in Engineering and Technology studies		
Answer	Number of respondents giving the answer	% of total responses
Easy and flexible access to international online resources pooled together in one place	1670	87.25
Possibility to rate and rank resources	745	38.92
Access to Virtual Labs	1467	76.65
Access to resources from different teachers (not just in our university), including from abroad	1451	75.81
Possibility to design own learning path	1156	60.40
Easy interaction with both peers and mentors	1353	70.69
Intuitive interface, easy to use	1250	65.31
Special help for students with disabilities	858	44.83
Special help for disadvantaged students	934	48.80

Would you be interested in using a platform like that in your studies?
1,929 responses

- Yes, I would be happy if some of our regular courses are organized like this
- Yes, but only for optional courses and additional learning
- No

71.2% 27.2%

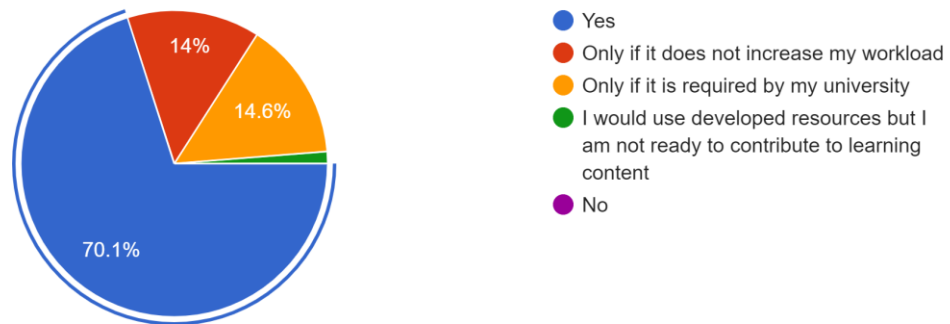| Representation of different areas of teaching and research		
Answer	Number of reached faculty members in this category	% of total responses
Accounting and finance, management, marketing	9	5.70
Manufacturing	2	1.27
Engineering, IT, Computer Science Electronics and related disciplines, including industrial, agricultural, environmental and civil engineering, Automation, Mechanical Engineering and Mechanics	118	74.68
Mathematics and algorithms	4	2.53
Innovation and Entrepreneurship	1	0.63
Language	2	1.27
Biology, Environmental Science, Medicine, Pharma and related disciplines	9	5.70
Psychology	1	0.63
Physics	1	0.63
Unidentified	10	6.37

Features of a new Technology Enabled Learning Environment in Engineering and Technology studies perceived as beneficial		
Answer	Number of respondents giving the answer	% of total responses
Modular access to a variety of international online resources, making it possible to pick and choose and re-combine different resources to best fit the needs of our students	109	68.99
An autonomous auditing and ranking process, involving the users themselves	34	21.52
Possibility to use Virtual Labs into training and teaching	119	75.32
Possibility for direct teaching collaboration with colleagues in other institutions in our country	79	50.00
Possibility for direct teaching collaboration with colleagues abroad	87	55.06

Should allow for flexible learning; learners should be able to choose their own study paths	85	53.80
Should promote flexibility at institutional level – the university should be able to adapt it to their needs	84	53.16
Continuously collection of feedback, peer reviews and data about usage	76	48.10
The system should be flexible and should allow us to respond to feedback and usage statistics by both learners and colleagues	67	42.41
Classroom creation and management should be clear and intuitive	87	55.06
The system should allow us to assess students based on interaction and collaboration, not just results on tests and assignments	95	60.13
Special attention and resources for disadvantaged learners	90	56.96

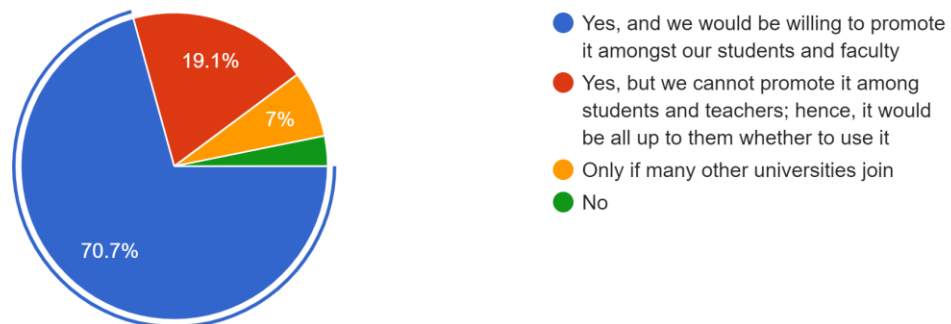| External online resources that should be incorporated into the new learning environment		
Answer	Number of respondents giving the answer	% of total responses
Moodle	115	72.78
Canvas	67	42.41
Blackboard	41	25.95
OER commons	13	8.23
Wiki Educator	24	15.19
OpenLearn Create	18	11.39
SlideWiki	19	12.03
MOOCs – Open University UK	25	15.82
MOOCs – MITx	41	25.95
MOOCs – edEx	44	27.85
MOOCs – Coursera	62	39.24
MOOCs – NPTEL	60	37.97

Would you be interested in using the new platform (delivering courses and contributing to learning content)?

157 responses

- ● Yes
- ● Only if it does not increase my workload
- ● Only if it is required by my university
- ● I would use developed resources but I am not ready to contribute to learning content
- ● No

Would you be interested in introducing such a platform at your university?

157 responses

- ● Yes, and we would be willing to promote it amongst our students and faculty
- ● Yes, but we cannot promote it among students and teachers; hence, it would be all up to them whether to use it
- ● Only if many other universities join
- ● No

Features of a new Technology Enabled Learning Environment in Engineering and Technology studies perceived as beneficial		
Answer	Number of respondents giving the answer	% of total responses
Modular access to a variety of international online resources, making it possible to pick and choose and re-combine different resources to best fit the needs of our students	54	83.08
An autonomous auditing and ranking process, involving the users themselves	20	30.77
Possibility to use Virtual Labs in the teaching process	59	90.77
Possibility for direct teaching collaboration between universities within our country	34	52.31
Possibility for direct teaching collaboration with universities from abroad	35	53.85
Should allow for flexible learning; learners should be able to choose their own learning paths	37	56.92
Should promote flexibility at institutional level – we should be able to adapt it to our needs	37	56.92
Continuously collection of feedback, peer reviews and data about usage	34	52.31
The system should be flexible and should allow us to respond to feedback and usage patterns by both students and peers	41	63.08
The system should be easy to use for our students and for other learners	44	67.69
Special attention to disadvantaged learners	35	53.85

Would you be interested in introducing such a platform at your university?

65 responses
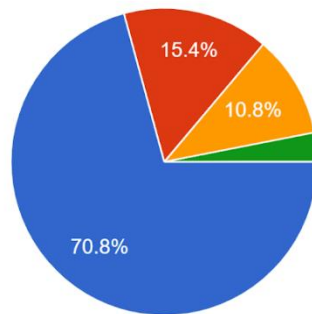
- ● Yes, and we would be willing to promote it amongst our students and faculty
- ● Yes, but we cannot promote it among students and teachers; hence, it would be all up to them whether to use it
- ● Only if many other universities join
- ● No

15.4%
10.8%
70.8%

Would you be interested in using the new platform (delivering courses and contributing to learning content)?

65 responses
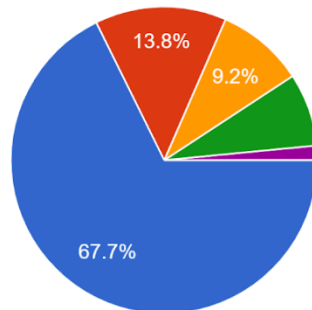
- ● Yes
- ● Only if it does not increase my workload
- ● Only if it is required by my university
- ● I would use developed resources but I am not ready to contribute to learning content
- ● No

13.8%
9.2%
67.7%

Distribution of institutions reached according to level		
	Number of reached institutions in this category	% of total responses
Local	6	37.50
Regional	3	18.75
State level (for India only)	1	6.25
National level	7	43.75

Areas of open and online education in Engineering and Technology where most urgent action is needed		
Answer	Number of respondents giving the answer	% of total respondents
Improving delivery	6	35.29
Improving quality	8	47.06
Widening access	5	29.41
Training and qualification of teaching and support staff	14	82.35

Features of a new Technology Enabled Learning Environment in Engineering and Technology studies perceived as beneficial		
Answer	Number of respondents giving the answer	% of total
A strong Quality Assurance framework inbuilt within the environment itself	10	58.82
An autonomous auditing and ranking process, involving the users themselves	5	29.41
Modular access to a variety of international online resources	11	64.71
Possibility for students to use Virtual Labs	13	76.47
Possibility for direct teaching collaboration between universities within our country	7	41.18
Possibility for direct teaching collaboration with universities from	13	76.47

abroad		
Should promote flexibility at institutional level – every university should be able to adapt it to their needs	8	47.06
User-friendliness; the environment should be intuitive to use, accessible and easy for many learners, even those from disadvantaged backgrounds and in remote areas	12	70.59
Should allow for flexible learning; users should be able to choose their own learning paths	11	64.71

Actions that should be undertaken to ensure that a newly developed Technology Enabled Learning Environment in Engineering and Technology study areas would be beneficial to Higher Education in our country		
Answer	Number of respondents giving the answer	% of total responses
Ensure that it does not replicate already existing delivery platforms but complements them and offers something genuinely new	10	58.82
Enable effective Quality Assurance in cooperation with responsible national agencies, including accreditation of programs	14	82.35
Make sure there is commitment by several universities to maintain and develop this platform further (sustainability)	12	70.59
Promote widely among many universities within the country	10	58.82
Promote widely abroad	7	41.18
Promote widely among potential learners	13	76.47
Promote widely among learners that are disadvantaged and have poor access to education	10	58.82
Train personnel and staff who will use and support it	13	76.47
Train learners how to use it	14	82.35

Plan for ways to make the platform usable by learners with disabilities	11	64.71

The stakeholders have expressed interest in making the following contribution toward in the use of the platform
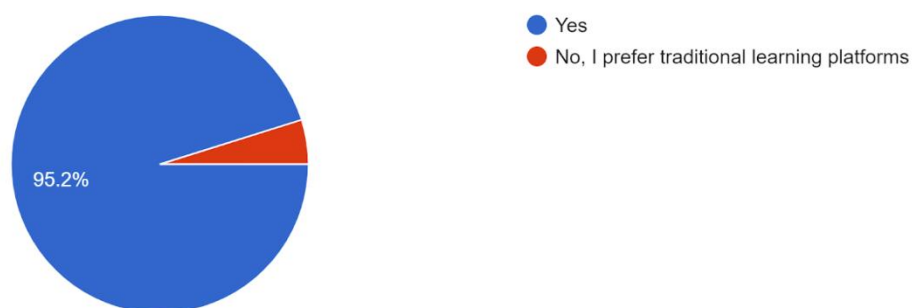
- Training of personnel
- Verifying the usefulness of the platform in applying different technologies
- Dissemination among potential learners
- Development of learning materials
- Ensuring a mass sign-up in the platform (students enrolled in engineering technology-related programs)
- Offering notable educators (experts in their respective fields) as speakers or contributors to the platform
- Participating in collaboration activities
- Plan for ways to make the platform usable by learners and learners with disabilities
- Dissemination among potential learners
- Supporting quality assurance

Features of a new Technology Enabled Learning Environment in Engineering and Technology studies perceived as beneficial		
Answer	Number of respondents giving the answer	% of total
Easy and flexible access to international online resources pooled together in one place	285	80.28
Flexible and unlimited access to resources developed at universities	234	65.92
Possibility to rate and rank resources	118	33.24
Easy and flexible access to international online resources pooled together in one place	285	80.28
Easy interaction with both peers and mentors	167	47.04
Intuitive interface, easy to use	173	48.73
Special help for people with disabilities	105	29.58
Special help for disadvantaged	115	32.39

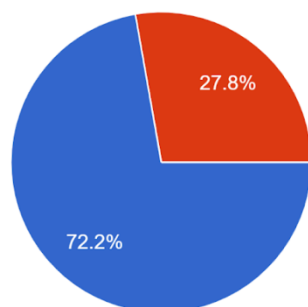Would you be interested in using a technology enabled learning platform for your studies?
352 responses

● Yes
● No, I prefer traditional learning platforms

95.2%

Features of a new Technology Enabled Learning Environment in Engineering and Technology studies perceived as beneficial		
Answer	Number of respondents giving the answer	% of total
Easy and flexible access to university resources pooled together in one place	11	61.11
Easy and flexible access to international online resources pooled together in one place	14	77.78
Possibility for our teachers/educators to collaborate with university staff	6	33.33
Access to Virtual Labs	10	55.56
Possibility for the learners design their own study path and to decide about the schedule of learning	10	55.56
Easy interaction for our learners with both peers and mentors	13	72.22
Intuitive interface, easy to use	10	55.56
Special help for learners with disabilities and disadvantaged learners	6	33.33

Do you think your constituency would benefit from a technology enabled learning platform in the study areas of Technology and Engineering
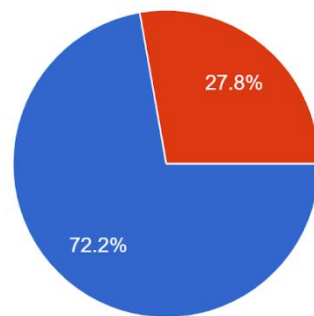
18 responses

- 🔵 Yes, this way they can learn without having to go to university
- 🔴 To some extent, if there are courses suitable for beginners
- 🟠 No, such education is only meaningful if a person studies at the university

27.8%

72.2%

Would you be interested in using this platform when you design and deliver non-formal education?
18 responses

- ● Yes, I would both use and contribute to the extent possible
- ● Yes, I would use it but I am not ready to contribute to content
- ● No, I prefer to use traditional learning platforms or online resources

72.2%

27.8%