



WPI

Developing a Digital Platform to Teach Entrepreneurship Pedagogy in Morocco

An Interactive Qualifying Project submitted to the Faculty of
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfilment of the requirements for the degree of Bachelor of Science

by

Christopher DeMaio

Elisabeth Lynn

Vy Tran

Hunter Wagner

Date:

May 4th, 2022

Report Submitted to:

Mr. Mouslim Ben Hajji

Moroccan Center for Innovation and Social Entrepreneurship

Professor Karen Oates

Professor Kenneth Stafford

Worcester Polytechnic Institute

This report represents the work of one or more WPI undergraduate students submitted to the faculty as evidence of a degree requirement. WPI routinely publishes these reports on its website without editorial or peer review.

ACKNOWLEDGMENTS

We would like to thank the following people for their contributions to our project:

Professor John-Michael Davis of the **Worcester Polytechnic Institute**, for his guidance and support in the proposal phase of the project. His enthusiasm for the global experience prepared us to make the most of our time in Morocco.

Professors Rebecca Moody and Mohammed El Hamzaoui of the **Worcester Polytechnic Institute**, for planning our global experience and offering their support throughout the project. Through their passion for Morocco, we were able to appreciate the detailed intricacies of a new culture and country.

Madiha Chafik and Haddou El Bour of the **Council on International Educational Exchange**, for welcoming us to the country and teaching us Darija. Thank you for helping us immerse ourselves in Moroccan life and explore all corners of Morocco.

Mousslim Ben Hajji of the **Moroccan Center for Innovation and Social Entrepreneurship**, for generously giving his time and energy to help our project succeed and for welcoming us to the MCISE family.

Professors Karen Oates and Kenneth Stafford of the **Worcester Polytechnic Institute**, for helping us navigate our complex and changing project.

EXECUTIVE SUMMARY

In 2020, 31.2% of Moroccans ages 15-24 were unemployed. Researchers attributed the high youth unemployment rate to a lack of well-paying jobs and the education system's failure to adequately teach young Moroccans essential interpersonal skills. To combat the youth unemployment crisis, nongovernmental organizations (NGOs) and the Moroccan government have made efforts to help young people succeed in a difficult economy. King Mohammed VI has implemented initiatives that encourage Moroccan women and young adults to pursue entrepreneurship. The government has also passed laws making it easier for small businesses to gain capital and market their products through grants and competitions. The Moroccan government has committed to training the next generations of entrepreneurs by investing in entrepreneurial training in collaboration with high schools, universities, and NGOs.

NGOs play a key role in the success of entrepreneurship education, as they organize and operate most initiatives. However, NGOs in Morocco face significant challenges. Many of their programs are run by unpaid interns and volunteers, making it difficult to maintain consistent personnel and curriculum. Moreover, their programs are limited by existing funding, causing their audiences to be smaller than desired and concentrated in accessible urban centers.

One of the leading entrepreneurial training programs is D.lab, developed by the Moroccan Center for Innovation and Social Entrepreneurship (MCISE), aiming to train trainers to teach entrepreneurship. To address the issues MCISE and other NGOs are facing, we developed a virtual learning platform to help transition some aspects of D.lab online. The platform would significantly reduce the time commitment required of MCISE's president and employees, allowing MCISE to focus on expanding D.lab and marketing it to a wider audience. The platform would also increase participant engagement in D.lab while being easy to both use and maintain. MCISE hopes to use the platform to package their D.lab program and market it to universities and other NGOs. They hope to leverage the online platform to grow their network of entrepreneurs, and they want the platform to serve as a community space where entrepreneurs can connect and share ideas.

The goals of the project were met by the following objectives and methods:

1. **Achieve a greater understanding of MCISE’s programs and their participants.**
Through a survey, we asked D.lab participants about their experience with the program.
Through interviews, we asked MCISE personnel about their perspectives on the program.
2. **Investigate virtual learning platforms to determine the best available option.** We identified commercially available learning management systems (LMSs). Through conversations with MCISE personnel, we identified seven required features and screened each LMS for these features. Each LMS that had all necessary features was assigned a score based on six additional qualities, weighted using a decision matrix. The three LMSs with the highest weighted total scores were presented to MCISE personnel, who selected their preferred LMS.
3. **Effectively facilitate the D.lab program in a virtual format.** Our LMS was made to present content clearly and to allow for easy communication between students and instructors. We engaged with users to understand how they perceived and interacted with the platform.
4. **Create instructional materials to ensure the platform’s sustainability.** Our team created a user guide to help MCISE use and maintain the platform.

Findings

Survey respondents had positive feelings about D.lab and expressed interest in an online version of the program, but they had concerns about preserving engagement and communication in an online format. The interviews provided a wealth of knowledge about what MCISE hopes to gain from the online D.lab platform.

Of the 31 platforms initially considered, 12 contained all necessary features. The top 3 of those 12, which were *Moodle*, *Open edX*, and *Tutor LMS*, were presented to MCISE personnel, who selected *Moodle* as the online learning platform to use for D.lab. The platform went through three main iterations. The first was a rough draft that was shown to MSICE personnel to get ideas and feedback about the general design and layout. The second design was published on the Internet and tested by experienced LMS users through a heuristic evaluation. From this evaluation, our team learned that the platform was mainly free of errors and was easy to

understand. However, the design and navigation of the platform had room for improvements. Based on the feedback from the experienced users, our team improved the platform's design once more. Finally, the platform and user guide were presented to MCISE personnel, who expressed confidence in the platform's ability to accomplish its goals.

Recommendations

We recommend that MCISE consider the following recommendations as they continue to grow as an organization:

1. **Invest in greater IT resources to improve the platform's functionality and usability.** The D.lab platform is currently hosted on *MoodleCloud*, which is *Moodle's* official hosting service; greater IT resources will be required to transfer the platform to MCISE's server in the future.
2. **Provide training materials to every user of the *Moodle* platform.** We also recommend that the IT personnel, administrators, teachers, and D.lab participants utilize the user guide we created and the plethora of help documentation produced by *Moodle*.
3. **Gradually transfer the teaching responsibilities of the D.lab program from the president to the platform and to MCISE's other trainers.** With our platform, MCISE has an opportunity to lighten the work required of its president, the only MCISE employee who runs the program. To achieve this, we recommend that some aspects of D.lab should be transferred to our online platform. As MCISE expands, D.lab could be altered to become a completely virtual training package, which could be sold to and facilitated by other NGOs. D.lab's audience consists of busy consultants, executives, and NGOs.
4. **Standardize D.lab's curriculum and focus the marketing strategies on sustainable growth.** As MCISE grows, they should standardize their current curriculum to ensure its scalability and repeatability across multiple instances of D.lab. While the essence of the D.lab program is to "change your mindset," it is also important for MCISE to branch out from that marketing approach to more data-driven strategies.
5. **Invest in efforts to increase their funding.** Using our platform, MCISE can begin to market their program and bring in more funding to use on their other projects. The

growth that this platform affords MCISE should provide them with the funding necessary to accomplish their goals and fulfill our recommendations.

With a more consistent curriculum and options for a shortened training period, D.lab can become marketable to a wider audience. With these recommendations, D.lab can evolve to be more profitable for the organization, and MCISE can look forward to expansion and their other long-term goals.

THIS SPACE
IS
INTENTIONALLY
LEFT
BLANK

ABSTRACT

The Moroccan Center for Innovation and Social Entrepreneurship (MCISE) is a Moroccan NGO that educates young Moroccans through its entrepreneurship and interpersonal skills programs. This project creates a virtual platform for MCISE's D.lab program, which trains professionals to assist novice entrepreneurs. Research on D.lab's structure and learning management systems allowed us to implement and iterate upon this online platform before presenting a final website and user guide to MCISE. The virtual platform allows participants to register, pay, track their progress, and create a space for participants and alumni to network and collaborate.

**THIS SPACE
IS
INTENTIONALLY
LEFT
BLANK**

AUTHORSHIP TABLE

Section	Author(s)	Editor(s)
Executive Summary	VT HW	CD
Abstract	EL	VT
Introduction	CD	HW
Background	CD EL VT HW	CD EL VT HW
Methods–Objective 1	EL HW	CD HW
Methods–Objective 2	VT	CD HW
Methods–Objective 3	CD	CD HW
Methods–Objective 4	EL	VT
Results–Objective 1	CD	CD EL
Results–Objective 2	CD HW	CD
Results–Objective 3	HW	CD
Results–Objective 4	HW	VT
Discussion and Recommendations	CD EL VT	CD EL
Appendix A	VT	EL
Appendix B	CD	EL VT HW
Appendix C	EL	CD VT HW
Appendix D	HW	CD
Appendix E	EL	CD
Appendix F	EL HW	CD
Appendix G	HW	CD
Appendix H	VT HW	CD
Appendix I	CD EL VT HW	CD EL VT HW
Appendix J	CD EL VT HW	CD EL VT HW

TABLE OF CONTENTS

ACKNOWLEDGMENTS	ii.
EXECUTIVE SUMMARY	iii.
ABSTRACT	vii.
AUTHORSHIP TABLE	viii.
TABLE OF CONTENTS	ix.
LIST OF FIGURES	xi.
LIST OF TABLES	xii.
1. INTRODUCTION	1
2. BACKGROUND	3
2.1 Recent Economic and Entrepreneurial Struggles in Morocco	3
2.2 Entrepreneurship Education: MOOCs and Other Courses	4
2.3 Promoting Entrepreneurship in Morocco: Recent Efforts and Challenges	6
2.4 A Review of Online Learning in the Age of COVID-19	8
2.5 Student Learning Styles	11
2.6 Established Best Practices	12
2.7 Summary	15
3. METHODS	16
3.1 Objective 1: Understanding MCISE Programs and Participants	16
3.2 Objective 2: Investigating Existing Platforms	17
3.3 Objective 3: Effectively Delivering Programs Virtually	18
3.4 Objective 4: Platform Management	19
4. RESULTS	20
4.1 Objective 1: Understanding MCISE Programs and Participants	20
4.2 Objective 2: Investigating Existing Platforms	24
4.3 Objective 3: Effectively Digitizing In-Person Programs	27
4.4 Objective 4: Platform Management	31
5. DISCUSSION AND RECOMMENDATIONS	32
5.1 Discussion	32
5.2 Recommendations	33
5.3 Conclusion	35
6. REFERENCES	36

APPENDIX A: MOROCCAN CENTER OF SOCIAL INNOVATION AND ENTREPRENEURSHIP	42
APPENDIX B: D.LAB PARTICIPANT SURVEY QUESTIONS	43
APPENDIX C: HEURISTIC EVALUATION PROCEDURE AND SURVEY	45
APPENDIX D: D.LAB PARTICIPANT SURVEY RESPONSES	48
APPENDIX E: MCISE MANAGING DIRECTOR AND PROJECT COORDINATOR INTERVIEW SUMMARY	53
APPENDIX F: MCISE PRESIDENT INTERVIEW SUMMARY	56
APPENDIX G: LMS REMOVAL TABLE	60
APPENDIX H. HEURISTIC TEST RESPONSES	62
APPENDIX I. USER GUIDE	70
APPENDIX J: IRB APPROVAL	71

THIS SPACE
IS
INTENTIONALLY
LEFT
BLANK

LIST OF FIGURES

Figure 1: The D.lab Course homepage on the first iteration of the <i>Moodle</i> platform.	28
Figure 2: The D.lab Course homepage on the second iteration of the <i>Moodle</i> platform.	29
Figure 3: The D.lab Course homepage on the final iteration of the <i>Moodle</i> platform.	31

THIS SPACE
IS
INTENTIONALLY
LEFT
BLANK

LIST OF TABLES

Table 1: Essential LMS Features	25
Table 2: Decision Matrix	26
Table 3: LMS Scoring Guidelines	26
Table 4: LMS Weighted Scoring	27
Table 5: Mean and Median Heuristic Ratings	29

THIS SPACE
IS
INTENTIONALLY
LEFT
BLANK

1. INTRODUCTION

In 2010, 17.6% of Moroccans ages 15-24 were unemployed; by 2020, that figure had risen to 31.2% (Statista, 2021). Researchers have attributed rapidly growing youth unemployment to various causes, including a lack of well-paying jobs for young adults and those young adults' lack of essential skills (Schäfer et al., 2015; World Bank, 2014). Professionals highlight the Moroccan education system's failure to adequately develop skills such as communication, project management, and teamwork in the country's students (Chaibate et al, 2019). The COVID-19 pandemic has only exacerbated this crisis, as has Morocco's increasing urbanization. As the region industrializes, rural citizens migrate into the cities, causing the urban population, and especially the urban youth population, to outpace the number of job openings (Hong, 2015; Maliari et al, 2021).

To combat the youth unemployment crisis, governments and nongovernmental organizations (NGOs) in Morocco and throughout the Middle East and North Africa (MENA) region have begun providing programs to help young people succeed in their difficult economies (Kabbaj et al., 2016). In recent years, these programs have increasingly focused on fostering innovation and entrepreneurship in children and young adults. These programs, aimed at teaching economic self-sufficiency and other interpersonal skills that young adults lack, were conventionally delivered as in-person, after-school programs, but the COVID-19 pandemic has forced organizers to rethink their format. In addition, organizers have begun to recognize the potential for online versions of their programs to increase accessibility. Yet, little research exists in the realm of developing virtual learning platforms to foster entrepreneurship and innovation.

Our project focused on creating a virtual platform to deliver D.lab, a program developed by the Moroccan Center for Innovation and Social Entrepreneurship (MCISE) to instruct professionals how to consult new entrepreneurs in Morocco. Currently, only about 20 people per year enroll in the in-person D.lab program, a number that MCISE hopes to increase by offering the program virtually. Please see Appendix A for a description of MCISE.

To address the knowledge gap in online entrepreneurship education, our team immersed ourselves in MCISE's in-person programs and explored commercially available virtual learning

platforms. By observing sessions of MCISE's entrepreneurship programs and talking to the programs' alumni and creators, we learned why students and educators value such programs and which parts of the in-person D.lab program needed to preserve when presenting it in a virtual format. By evaluating a range of virtual learning platforms on the market, we learned how others accomplish the goal of delivering an engaging course online, and considered how our team can best present an entrepreneurship-focused course in a virtual setting. Our team then collaborated with MCISE to determine a list of key features and designed a virtual platform for D.lab. Finally, we developed training materials for our platform to ensure its financial and technological sustainability in the coming years.

In our background chapter, we describe our research on entrepreneurship education and online learning. We discuss Morocco's economic situation, the growing popularity of entrepreneurship and innovation, and the emergence of the country's NGO sector. We then focus our attention on online learning, its advantages and disadvantages, its effects on students of various learning styles, and the features most important to developing an online course. In our methods chapter, we describe how our team answered our research questions and achieved our goals. We improved our understanding of MCISE's programs, evaluated existing virtual learning platforms, and designed and developed a platform. Our team ensured that the platform is easy to learn and use by conducting extensive usability tests and developing comprehensive training materials. In our conclusion chapter, we summarize our findings and demonstrate the importance of our work.

2. BACKGROUND

In this chapter, we discuss the current state of Morocco's economy and the efforts being made by the government and NGOs to improve the economy. We consider entrepreneurship in the country and the ways in which entrepreneurship is taught. We then shift our focus to online learning, discussing perceptions of online learning, student learning styles, and established best practices as the world emerges from the COVID-19 pandemic.

2.1 Recent Economic and Entrepreneurial Struggles in Morocco

The Moroccan economy is rapidly developing. Over the past decade, Morocco's government has invested 20 billion MAD (approximately \$2.7 billion) towards industrializing the nation, and they have bolstered the nation's infrastructure as well (Amraoui et al., 2019). However, the gap between the rich and poor remains higher in Morocco than in other MENA nations, and many Moroccans have yet to feel the benefits of the government's industrialization initiatives (Becheikh, 2021). Among the top issues that Morocco faces is the pressure to create more jobs to serve the growing number of entrants to the labor market. Economists and policymakers agree on the importance of entrepreneurship in decreasing unemployment and boosting a country's economy (Elmuti et al., 2012). With growth in entrepreneurship, Moroccans will create more businesses and, in turn, more jobs. However, many Moroccan young adults are not prepared to achieve entrepreneurship success; educational and societal barriers stand in their way.

Morocco's education system inadequately prepares its students for success in Morocco's economy. In 2017-18, Morocco's education system ranked 120th out of 137 nations considered, a result that researchers attribute to a combination of King Hassan II's decades-long strategy of suppressing Morocco's rural population and the social unrest that followed the Arab Spring (Becheikh, 2021; Bergh and Rossi-Doria, 2015). Illiteracy rates remain high in Morocco, with over 25% of Morocco's adult population being unable to read in 2018 (*UNESCO Institute for Statistics*, 2020). These problems follow students as they leave the education system, hindering them in their search for gainful employment. Recent surveys consistently show that business executives place an "inadequately educated workforce" among the biggest barriers to

successfully doing business in Morocco (Becheikh, 2021). Similarly, Kabbaj et al (2016) found that Moroccans in the entrepreneurship field commonly lament the education system's neglect of crucial innovation and creativity skills and its failure to foster an entrepreneurial spirit in Morocco's youth. These problems cause Moroccans to struggle when they enter the workforce, and they hinder Moroccans' ability to get a job or start a business.

Entrepreneurs' success depends heavily on their environments, and contextualizing that environment in relation to social norms, gender roles, and cultural expectations is crucial to understanding entrepreneurs and the challenges they face (Kalafatoglu & Mendoza, 2017). For example, many entrepreneurs rely on networking as a tool to achieve their goals. However, because entrepreneurs in the MENA region rely heavily on personal networks to leverage knowledge and capital instead of relying on professional networks, they often lack the necessary connections to grow their business (Zali et al., 2013). Often, prospective entrepreneurs presume that entrepreneurship is only reserved for well-connected people and thus feel discouraged from starting their own businesses. Women, young adults, and those from rural areas are especially disadvantaged by the scarcity of successful role models and necessary training (Gray, 2001). The lack of access to entrepreneurial training and networking opportunities may be the most important barrier to overcome when striving for entrepreneurship success. Several empirical studies found a positive correlation between an entrepreneurship education and starting a business, as well as between entrepreneurship education and social competence, networking skills, and overall entrepreneurial skills and venture effectiveness (Elmuti et al., 2012; Graevenitz et al., 2010; Karimi et al., 2016).

2.2 Entrepreneurship Education: MOOCs and Other Courses

Traditionally, entrepreneurship classes are taught in a classroom setting, with the main topic broken down into multiple components. The first component involves the interpersonal skills required to succeed, such as public speaking, leadership, and communication. Then, students learn the next component: technical skills like resourcing and content development. The final component consists of the management skills required to maintain the business. Globally, online open courses that teach entrepreneurial training are not a new concept. Universities such as Stanford, MIT, and Harvard have partnered with massive open online course (MOOC) providers to deliver a wide range of topics to individuals who are undertaking the entrepreneurial

process (Secundo et al., 2021). These courses' content covers a variety of the aforementioned components of entrepreneurship education: MIT's "Becoming an Entrepreneur" edX course gives students an overview of entrepreneurship, while the University of Pennsylvania's "Entrepreneurship" Coursera series teaches more specific topics, such as ideation, growth strategy, financing, and project capstones. While these MOOCs can provide useful knowledge in an easy-to-access format, they often suffer from high dropout rates; one MOOC intended to teach entrepreneurship to Moroccan Ph.D. students began with 143 participants but only had 8 participants remaining after week 5 (Fakhreddine et al, 2018). This striking dropout rate is typical for MOOCs because students often feel that the courses are not worth their time and thus become disengaged.

The mode of delivery may vary from asynchronous to synchronous. Some programs, such as Stanford University's "Entrepreneurship Corner," offer podcasts and focused videos on successful entrepreneurs, including Google's Larry Page and Metaverse's Mark Zuckerberg (Cirulli et al., 2016). In recent years, the popularity of entrepreneurship courses on platforms such as edX, Coursera, and Udemy has risen as online learning has become more popular (Secundo, 2021). Since the Moroccan Ministry of Higher Education and Research launched "Maroc Université Numérique" (Morocco Digital University), a platform that hosts online courses of various types, more Moroccan public and private universities have started to launch their own entrepreneurial MOOCs. Among these are University Mohamed V and University Cadi Ayyad, showing online platforms as a promising alternative to traditional entrepreneurship education.

In addition to MOOCs, private online entrepreneurship courses integrate digital infrastructure to advance startups beyond the conceptualization stage, where many businesses struggle to survive. The digital infrastructures support pre-market stage activities such as raising capital (Angel.co, crowdfunding sites), crowdsourcing (Amazon Mechanical Turk for oversea outsourcing), e-marketing, and realizing prototypes (FabLearn Labs network as an online makerspace that provide access to Amazon Web Services, Microsoft Azure, 3D printing) (Secundo, 2021).

2.3 Promoting Entrepreneurship in Morocco: Recent Efforts and Challenges

Entrepreneurship is growing in popularity in Morocco. Morocco's government recognizes the ability of entrepreneurs to create large numbers of high-quality jobs, and it has taken steps over the past 20 years to promote entrepreneurs (Fakhreddine et al., 2018, Kabbaj et al., 2016). For example, the government has implemented initiatives that encourage Moroccan women and young adults to pursue entrepreneurship, and the number of women and young adult entrepreneurs has, in turn, risen (Gray, 2001). The government has also passed laws making it easier for small businesses to gain capital and market their products, and they have organized competitions, conferences, and other events for young entrepreneurs to gain experience and exposure (Kabbaj et al., 2016). Finally, the government strives to train the next generation of Moroccan entrepreneurs; it is collaborating with Moroccan universities and NGOs to develop and publicize entrepreneurship training programs for children and young adults (Fakhreddine et al., 2018). While Morocco's economy still has not reaped the full benefits of these initiatives, the initiatives have had some effects: a recent study found that 67.6% of Moroccan college students have taken an entrepreneurship course, while only 44.6% of college students worldwide have taken such a course (GUESSS, 2016).

As a direct result of these government initiatives, many NGOs¹ have taken the initiative to create programs that teach entrepreneurship and interpersonal skills, which students may not learn in school. For example, MCISE has developed Tanara, an after-school program that teaches entrepreneurship skills to high school students, and D.lab, an intense training program to equip professionals with tools and knowledge to advise young entrepreneurs. Formateur Pro, a similar program to D.lab, helps educators receive more training and connect to other educators. TOTAC similarly offers networking, consulting, and training to teachers, NGO employees, and others who hope to foster entrepreneurship in Morocco's youth. These NGOs hope that, by conducting these programs, they will provide the next generation of Moroccan entrepreneurs with a wealth of resources that were previously unavailable. Entrepreneurs would then find more success, leading to a vibrant, robust Moroccan economy.

¹ These NGOs include MCISE, INJAZ Al-Maghrib, Enactus, Jeunes Leaders Marocains (Young Moroccan Leaders), and Le Centre Marocain des Etudes et des Recherches sur l'Entreprise Sociale (Moroccan Center for Studies and Research on Social Enterprise).

MCISE's D.lab program is the main focus of this research. Created in 2015, D.lab aims to train professionals to teach entrepreneurship skills to young Moroccans. It is the first program in Morocco that formally trains people in this area and gives them access to the best tools and frameworks for advising young entrepreneurs and start-ups. D.lab consists of three modules, "Mindset: From inspiration to impact," "Innovation: Human," and "Evaluate and measure the impact of the projects," each of which is followed by 40 hours of practice in the field. This intensive training instills participants with an understanding of how to work with young entrepreneurs to maximize their chances of success.

There are many challenges that come with the creation of these entrepreneurship programs in the MENA region. In Western Iran, cultural barriers have led to a lack of respect for these NGOs, since teaching innovation and entrepreneurship is not a widely accepted need (Naderi et al., 2020). In Israel, there has been a large miscommunication between NGOs and teachers, who claim to feel "useless" and neglected while NGOs take charge in shifting educational priorities (Yemini & Sagie, 2015). Additionally, since the teaching of entrepreneurship skills is relatively new, the subject and its terminology can get complex and suffer from a linguistic barrier. For example, "entrepreneurship," when translated into Arabic, is the same word as "enterprise" (El Fasiki, 2013). This translation likely influences how Arabs understand entrepreneurship and may hinder efforts by Westerners to teach entrepreneurship.

The most significant challenge to NGOs teaching entrepreneurship is that of providing participants accessibility. Currently, most programs are run in person by the NGO's employees or volunteers. However, this format requires significant monetary and time commitments from both the program leaders and those that enroll in the program, and it causes these programs' audiences to be smaller than desired and concentrated in urban areas. For example, MCISE's D.lab program only reaches 20 people per year. To increase accessibility and alleviate some of the burden placed on those that enroll in these programs, NGOs like MCISE are turning to online learning. By offering programs online, NGOs can reach people regardless of geographic location. They can also format their programs to allow students to complete assignments and absorb content at their own pace. NGOs hope that, by delivering their programs virtually, they can reach more people and increase the effects they have on Morocco's entrepreneurship environment. Online learning also has drawbacks; educators often struggle to engage students

and foster collaboration when students are not in the same room. The next section contains a comprehensive analysis of the advantages and disadvantages of online learning, along with best practices for online learning.

2.4 A Review of Online Learning in the Age of COVID-19

Online learning is generally defined as the use of technology to teach skills or concepts to people who are not physically present in a classroom (Fry, 2001). This style of education has been in use for as long as the Internet has been popular, and it has grown from a tool used only for corporate education and some niche higher education settings to an essential aspect of many students' educations (Fry, 2001). According to the Institute of Education Sciences, the percentage of American students taking at least one course online rose from 25.9% in 2012 to 37.3% in 2019. Even before COVID-19, many institutions recognized the significant benefits of delivering content online. During COVID-19, online learning was utilized as a necessity rather than a choice, changing the perception of remote learning. The size of the global e-learning market rose from \$165.36 million in 2014 to \$243.8 million in 2022 (*E-Learning Worldwide Market Size 2014, 2022*). MOOC platforms are common with open-source content, asynchronous delivery, and an expertly-designed curriculum that offers the flexibility needed to allow everyone with access to a computer and internet access to self-learn.

Although little literature had systematically categorized online learning platforms, online learning can be categorized by (1) form of student participation: interactive (two-way communication between teacher and student), individual, or collaborative (students achieving learning goals as a group) learning; (2) mode of delivery: synchronous or asynchronous; (3) the rate at which content is delivered: fixed e-learning (everyone receives the same material at the same time), adaptive e-learning (everyone receives material at personalized rate), or linear e-learning (students learn from content targeting mass audiences, like television or radio), and (4) the involvement of technology in providing feedback: Computer Assisted Instruction (CAI) (integration of online quizzes, drills, and practice) or Computer Managed Learning (CML) (a computer assesses students' knowledge and provides extra help in the areas where students struggle) (Tamm, 2021). The various methods of delivery enable educators to choose the best ways to present their content to fit students' needs. Methods such as adaptive learning and CML

further automate this process. Instead of the teacher thinking through the content and personalizing the curriculum to students' needs, the computer acts as a teacher in these scenarios and utilizes machine learning to deliver content to students. Simultaneously, researchers are learning more about best practices and modes of online delivery to improve online learning after the COVID-19 pandemic transformed the education landscape.

Recent literature is rife with lessons learned during the COVID-19 pandemic that can be applied to myriad online learning applications. Castro & Tumibay (2019) found that students' online learning success is proportional to their digital literacy, intrinsic motivation, and participation in discussion and in-class activities. To facilitate this success, educators should plan and design courses that would take in-person interactions and contextualize them for online purposes, such as group works and discussion forums (Carrillo & Flores, 2020; Castro & Tumibay, 2021). Educational institutions then need to provide technical and academic support such as "stable internet connection," "platform function and stability," and "technical support services" (Chang & Fang, 2020).

As the pandemic continues and society looks forward, students and educators are considering incorporating online learning as a more permanent feature instead of as an emergency response. In a 2021 survey of undergraduate students in 21 countries, about 48% said that they would like their university to permanently increase their online learning offerings, while 34% said they would not (MENAFN, 2021). Regardless of preference, COVID-19's unpredictable nature and the ever-increasing presence of technology mean that online learning will remain an important part of education for the foreseeable future.

The rapid emergence of online learning sparked ongoing discussions about the advantages and disadvantages of implementing e-learning as a permanent feature of education. There are many advantages to online learning when compared to in-person learning. Online learning allows students to get a learning experience from the comfort of their own homes and during any time of the day if asynchronous. Additionally, they can rewatch the same lectures multiple times to go over confusing topics or jot down key points they may have missed in the first viewing. This can lead to a more in-depth understanding of the topics covered and allow students to self-direct their education (Kemp & Grieve, 2014).

Public online platforms like MOOCs also support a larger and more diverse community of stakeholders, learners, and educators. Online platforms can support faster stakeholder-student communication, foster successful workshops and seminars, and expand the reach of valuable mentorship. Online platforms may widen the access to people who are otherwise marginalized from a traditional entrepreneurship curriculum. Youths, women, individuals from rural areas, individuals with familial or financial constraints, and even non-business students are among the groups who may be introduced to entrepreneurship training for the first time (Gray, 2001). Online learning can also reduce the financial and time barriers associated with traveling and attending higher education (Canada et al., 2021). Digital technology could be fundamental to building effective courses and promoting entrepreneurial spirits and competencies within students, and it may collectively solve the economic, social, and global issues the world is facing (Secundo et al., 2021).

Online learning has shortcomings that are not present in in-person learning. Most of the advantages of online learning only hold true for lecture-based courses. Resource-intensive experiences, such as lab-based courses, are difficult to get when taking the course online. For example, a remote student would not have access to the special equipment a university might offer to its in-person students. Online learning requires a higher level of self-motivation to stay on top of all the school work (Kemp & Grieve, 2014). Online students are more likely than in-person students to be distracted and multitask, and the lengthy video lectures may cause them cognitive overload (Mukhtar et al., 2020). The overall learning experience can be less efficient while the online learning workload can be more demanding to make up for the missing in-person component, leading to more frustrations and isolation among students (Mukhtar et al., 2020). Without the in-person setting, students more easily fall behind without the support they can easily get from engaging with their peers or instructors.

Academic integrity is hard to control in online courses. Muhktar et al. (2020) discussed the difficulty associated with implementing a secure online examination system. Little can be done to stop a student from cheating while taking an online examination. This ties back into students' self-motivation; if students feel that they are slipping in their classes, they can more easily cheat on the assignments instead of putting in the effort to earn the grade on their own. One aspect of education that is hard to replicate in online learning is the impactful connections

that humans make when they are together. Personal connections among classmates and between students and teachers are very difficult to create in an online setting where each person may only be identifiable by a name or a profile picture ((Bolliger, 2004; Martin & Bolliger, 2018; Roblyer & Ekhaml, 2000); (Bolliger, 2004; Martin & Bolliger, 2018; Roblyer & Ekhaml, 2000)). Another limitation to online learning is the access to the technology and technical support required to take these courses. Not everyone has their own personal computer, let alone the stable internet needed to participate in video conference calls. Finally, different students can have different learning styles, which online courses may not support.

2.5 Student Learning Styles

Each student has their own learning style that helps them get the most out of their education. Most students identify themselves as having one or more of Neil Fleming's "VARK" learning styles (Fleming, 1995). Fleming breaks down "VARK" into 4 different categories: "V" is for visual, "A" is for auditory, "R" is reading/writing, and "K" is for kinesthetic learners. Visual learners (V) learn best when presented with information in the form of clear graphs and charts. They usually try to follow a visual hierarchy from one set of information to the next. Auditory learners (A) learn best when the information is spoken to them clearly and concisely. These learners have the best learning experience when they communicate verbally in group settings or listen to presentations. Reading and writing learners (R) can be described as students that learn best when information is given to them in text-heavy resources. They perform best when they take down lots of notes and have lots of literature to review. Kinesthetic learners (K) get the best learning experience when they can take a more active role in their learning. They thrive off of hands-on experience and can be seen performing well in lab scenarios.

Online learning has made it challenging for some of these students with different learning styles, especially those who learn through collaboration and hands-on experiences. One way to incorporate interactive experience is through gamification. One study has shown that when the e-learning gamification experience is tailored to each student, the student's motivation to continue increases by 25%, and the drop-out ratio is reduced by 26% (Hassan, 2021). The virtual learning platform should include videos and graphs for the visual learners, recorded lectures for the auditory learners, books and literature on relevant topics for the reading and writing learners, and interactive modules for the kinesthetic learners.

Educational institutions have provided online learning options to students for the past few decades. In that time, researchers have investigated how to most effectively teach students without interacting with them in person. The studies they perform most commonly focus on how to maximize students' engagement in the online classroom, with an emphasis on communication and collaboration (Carrillo & Flores, 2020; Castro & Tumibay, 2021). They also consider ways to ensure that students learn as much as possible from online courses, considering issues such as technological access, learning assessments, and course format.

2.6 Established Best Practices

In 1987, in "Seven Principles for Good Practice in Undergraduate Education," Chickering and Gamson proposed a set of seven principles aimed at promoting student engagement and improving student performance in the classroom: (1) student-faculty communication, (2) student collaboration, (3) active learning, (4) timely, detailed feedback, (5) students' time commitments, (6) high expectations, and (7) diversity. While these principles were designed with in-person classrooms in mind, they are relevant to online classes as well. Many studies have noted the heightened importance of engagement and interaction in online learning, in which facilitating communications between students and instructors is more difficult than in-person learning (Bolliger, 2004; Martin & Bolliger, 2018; Roblyer & Ekhaml, 2000).

Students regularly rank teacher communication as an important aspect in determining their satisfaction in online classes. A study of 155 graduate students found that, while students value student-student interaction and student-content interaction, students value student-teacher interaction more (Martin & Bolliger, 2018). This study also found that in graduate students (mean age=39.6), regular communication from instructors is the most important practice to follow to maximize engagement (Martin & Bolliger, 2018). Another study, mainly focused on undergraduate students, found student-student interaction and student-content interaction as more effective in promoting student success than student-teacher interaction (Bernard et al., 2009). Bernard (2009) points out that, while student success and engagement are often correlated, their relationship is not always directly linear. These two studies' findings demonstrate the importance of multiple types of interactions, even if they cannot conclude that one type of interaction is strictly more important than others. When designing online courses, one of the challenges

educators may face is to determine which strategies will most effectively promote interaction between students, instructors, and content.

Collaboration among students is crucial to student engagement and learning, but it is difficult to achieve in an online format. Scholars regularly report that students learn more and enjoy their courses more when they collaborate, but that they collaborate less frequently in online classes (Bolliger, 2004; Means & Neisler, 2021; Schrenk et al., 2021). In Martin and Bolliger's (2018) meta-analysis study, students reported that they valued student-student interaction, and they found both synchronous and asynchronous discussions to be especially important. Abrami (2011) corroborates these results, recommending small-group assignments and a collaboration-focused curriculum for maximum benefit. While students benefit consistently from most kinds of student-student collaboration, they will learn the most only if they are taught the skills and strategies they need for effective collaboration (Abrami et al., 2011). Bernard (2009) warns that collaboration may not be reaching its full potential, especially in an online environment where many students and teachers may not understand how to implement it successfully (Bernard et al., 2009).

Assessing students' knowledge becomes more difficult to do fairly in an online class. Many educators and researchers have expressed their concerns about students cheating when taking online tests (Schrenk et al., 2021). Students can and will cheat on tests given in any format, and educators must consider the benefits of creating more secure assignments against the effort that would require. Besides online assessment, educators may facilitate learning through feedback: studies have shown that students value clear, prompt feedback on their assessments as well as detailed rubrics provided before the assessment is due (Martin & Bolliger, 2018; Roddy et al., 2017). In addition to promoting collaboration and hands-on learning, projects discourage cheating by giving students more agency over their assignments and requiring unique results from each student.

The format in which online courses are operated impacts student learning and must be considered when designing online courses. Synchronous learning generally motivates students more than asynchronous learning, keeping students engaged with their instructors and classmates (Means & Neisler, 2021). However, asynchronous learning offers students more flexibility,

allowing students to better balance their classes with jobs, families, and other life commitments (Schrenk et al., 2021). Instructors and curriculum developers should weigh these factors carefully when designing an online course by considering their students' varying needs and presenting material in a format that fits those needs. For example, a 2007 study at the University of Southern Mississippi showed students consistently rating synchronous online courses higher than asynchronous ones (Ward et al., 2010). A different study, though, at the Iowa State University showed that students did not rate asynchronous courses any differently than synchronous ones (Miller & Webster, 1997). In both studies, surveys were distributed to adult students who completed online courses either synchronously or asynchronously; students were asked to rate their overall satisfaction with the course as well as how different aspects of the course positively or negatively impacted their experiences (Miller & Webster, 1997; Ward et al., 2010). Discrepancies between studies of this nature may result from differences in the administration of the courses and the instructors' efforts to maintain engagement, or they may be a product of the courses' subjects: the students at the University of Southern Mississippi, who rated synchronous courses higher than asynchronous ones, were studying leadership, while Iowa State University students, who rated both delivery methods equally, studied agriculture. The leadership courses may have relied more heavily on collaboration than the agriculture courses, and the leadership instructors may have failed to adequately deliver the same collaborative experience to asynchronous students that they delivered to synchronous students.

Finally, students and educators should have access to the technology required to complete online courses, and understand how to use that technology. Many researchers have found that students who suffer from a technological barrier experience frustration and learn less than students who have access to sufficient technology; this technology barrier overwhelmingly hinders low-income students, a demographic known to face numerous other obstacles at all levels of education (Bolliger & Martindale, 2004, Cramp et al, 2019; Pillai & Sivathanu, 2019; Ward et al, 2010). To alleviate this, researchers recommend that online courses come with technical support resources for both instructors and students (Pardino et al., 2018). Regardless of the online platform the instructor uses or the instructor's method of teaching, all participants must be able to easily access content and complete assignments. Students and instructors must therefore either have sufficient technological skills before joining an online course or undergo training to gain those skills. Roddy et al. (2017) claim that an instructor's technological

competency is as important to the success of their class as their communication skills or pedagogical methods.

2.7 Summary

Existing literature paints a picture of a developing Moroccan economy that is leaving young adults behind. As NGOs and the government search for solutions to the economy's troubles, they encourage young Moroccans to pursue entrepreneurial ventures and strive to teach young Moroccans the skills needed to succeed in Morocco's economy. As a result of the COVID-19 pandemic, NGOs and the government have turned to online learning to continue and expand the entrepreneurship programs they established. Recent literature is rife with recommendations for online learning best practices, but little work has been done to investigate the application of online learning to entrepreneurship programs.

THIS SPACE
IS
INTENTIONALLY
LEFT
BLANK

3. METHODS

In this section, we provide the methods used to implement a virtual platform to help facilitate MCISE's D.lab program. The goal of this platform is to create a community of trainers and consultants, provide easy access to program content, and support the in-person schedule. We have identified the following objectives, which were completed as we built an online platform:

1. Achieve a greater understanding of MCISE's programs and their participants.
2. Investigate virtual learning platforms to determine the best available option.
3. Effectively deliver the D.lab program in a virtual format.
4. Create instructional materials to ensure the platform's sustainability.

3.1 Objective 1: Understanding MCISE Programs and Participants

To understand how to best replicate MCISE's in-person D.lab program with our digital platform, our team obtained information from two different groups: participants of the in-person D.lab program and the creators of both D.lab and MCISE's other program, Tanara. This information aided us in our decisions regarding key modules, networking opportunities, and means of accessibility for the platform.

3.1.1 D.lab Participant Survey

To comprehend the perspective of our audience, adult trainers, a survey of previous D.lab participants was conducted using Google Forms. The survey included 14 open-ended questions, which allowed us to ask about participants' background and their experiences with D.lab. A complete list of survey procedures, questions, and information provided to participants can be found in Appendix B.

Our team reviewed the participants' responses, which were collected via Google Forms. By identifying patterns among participants' responses, our team identified the aspects of D.lab that students value most and ensured that those aspects were prioritized when creating our virtual learning platform. Participants' advice from the survey was incorporated into the implementation of our learning platform to ensure that the platform catered to their goals, values, and needs.

Twenty D.lab alumni were sent the survey. Surveys were translated into French by MCISE personnel.

3.1.2 MCISE Program Developer Interviews

MCISE has already created a virtual platform for one of its entrepreneurship programs: Tanara. The virtual Tanara platform reflects MCISE's goals for their entrepreneurship education programs and demonstrates what MCISE expected from our virtual D.lab platform. To further our understanding of the online Tanara platform's development and to conceptualize how we may apply some of that platform's principles to our learning platform, unstructured interviews were conducted with the MCISE employees who developed Tanara and the employees who developed D.lab. This interview format allowed the conversation to flow most naturally and allowed us to best respond to the interviewees as they brought up new ideas. The information gathered here guided the implementation of our online learning platform.

3.2 Objective 2: Investigating Existing Platforms

To understand how others have successfully delivered online classes, a search was conducted to identify and evaluate existing virtual learning platforms. There were several learning management systems (LMS) on the market, including Canvas and Google Classroom. We systematically reviewed each LMS to identify key features as well as strengths and weaknesses.

3.2.1 Search Strategy

An extensive content search was performed using Internet search engines and our sponsors' knowledge. We started with broad keywords, such as "Learning Management System" and "E-learning," before refining our search using new keywords as our understanding of the field developed. Our team also built upon previous student work to develop a list of LMSs to investigate (Chakravarti et al., 2018). We consulted experts at MCISE to leverage their knowledge of learning platforms in the entrepreneurship niche and to seek their input regarding important criteria to include when evaluating the platforms.

3.2.2 Evaluation

Through discussions with MCISE representatives, our team developed a set of goals that our online platform needed to accomplish and features it needed to have. These required elements involved topics such as reliability, security, cost, ease of communication, and collaboration facilitation.

To narrow the list of potential LMSs, the list was filtered according to two phases: necessary features and other important qualities. In the first phase, any online platform that did not include all necessary features was removed from the list. In the second phase, our team focused on qualities that MCISE listed as important but that were not essential requirements. These features were weighted through a decision matrix. Each LMS that remained after the first phase was thoroughly examined and assigned a score for each quality in the decision matrix. Using these scores and the features' weights, each LMS received a total weighted score. The top three LMSs based on this rating were presented to MCISE, who made a final decision on one LMS.

3.3 Objective 3: Effectively Delivering Programs Virtually

We built off of results from the first two objectives to implement the virtual learning platform. This platform was made to present content clearly and allow for easy communication between students and instructors. It is also free for MCISE, easy to use, and easy to maintain. To maximize the usefulness of our platform, we engaged with users to understand how they perceived and interacted with the online platform. Learning from users allowed us to iterate upon our work and create a robust design that works for every student and educator.

3.3.1 Data Collection

To understand the strengths and weaknesses of the platform, a heuristic evaluation was conducted with participants who have experience using virtual learning platforms. An experienced user was defined as someone who has used and felt comfortable using at least one online learning platform before. Twenty users participated in this study; ten were given the role of teacher, and ten were given the role of student. These participants were given time to explore the platform, test its features, and take notes about its qualities. After the participants had

sufficiently explored the platform, they were asked to evaluate it based on Nielsen's 10 Usability Heuristics (1994). For each heuristic, subjects were asked to rate the platform on a scale of 1 (catastrophic problem) to 5 (no problem) and were given room to explain their rating if they chose. Please refer to Appendix C for the test procedure and survey questions, including the ten heuristics.

3.3.2 Analyzing Data

After completing the heuristic evaluation, the participants' ratings were analyzed by examining the mean and median to determine where the consensus lies. The platform's worst problems were identified and addressed by altering the parts of the virtual learning platform with the lowest average scores. Consideration was given to the explanations given by participants. A key phrases search was utilized to find patterns among the written responses, in order to gain further insight into the participants' perceptions of the online platform.

3.4 Objective 4: Platform Management

The virtual learning platform must remain useful to MCISE after the project's completion. To mitigate any confusion about how the platform was made and can be altered, a comprehensive instructional handbook was created. This handbook includes thorough guides on how to manage the online platform and was given to MCISE personnel upon completion. Templates for certain sections of the webpage were included to maintain consistency across the entire platform, as well as a quality control checklist as demonstrated in previous student work (Austin et al., 2021). Screenshots of the online platform were included in the user guide so that MCISE's team can easily understand the written instructions.

4. RESULTS

A survey and two interviews were conducted, and they provided useful information about MCISE and its programs. This information guided the search for an optimal LMS. The LMS chosen was then implemented and evaluated using experienced LMS users. Feedback received from those users was used to improve the D.lab platform. Finally, a user guide was created to explain how students and teachers can accomplish crucial tasks through the platform.

4.1 Objective 1: Understanding MCISE Programs and Participants

4.1.1 D.lab Participant Survey

The survey was translated into French by MCISE personnel and distributed to the 20 current D.lab participants, all of whom had recently completed the second of D.lab's three three-day workshop sessions. After multiple reminders, four participants responded in the week of April 17, 2022. Survey responses, which were translated into English by MCISE personnel, can be found in Appendix D. The following information was gathered from the survey responses:

1. D.lab participants come from the fields of finance and education.
2. D.lab participants enrolled in the program to learn more about entrepreneurship and entrepreneurship training.
3. Participants viewed the program as easy to complete.
4. Participants viewed the program as engaging.
5. Participants think the program moves slightly too slowly.
6. Participants believe that interpersonal interactions and group exercises are both the most important parts of D.lab and the most difficult parts to present in an online format.
7. Participants who have experience with online learning were dissatisfied with the interpersonal interactions in their online course(s).
8. Participants expressed mild interest in an online version of D.lab.
9. Participants are interested in other entrepreneurship training programs from MCISE.

4.1.2 MCISE Program Developer Interviews

Unstructured interviews were conducted with MCISE personnel to understand their perspectives on D.lab and their expectations of the virtual D.lab platform. One interview was conducted with the operations director and the managing director, and a second interview was conducted with the president. These interviews revealed new information about MCISE's goals for the D.lab program. Notes about these interviews can be found in Appendices E and F, respectively.

The first interview was conducted with the managing director and operations director. The following information was gathered from the interview:

1. MCISE needed the D.lab platform to accomplish certain tasks and include certain features.

The managing director stressed the need for a versatile calendar feature, which MCISE would use to schedule workshops and other events for D.lab participants and alumni. She also highlighted the importance of communication between stakeholders, meaning that both public discussion forums and private messaging services were crucial to the platform. In addition, she shared MCISE's desire to market D.lab to a broader audience; as a result of this desire, MCISE wanted participants to be able to enroll in and pay for D.lab through the virtual platform. MCISE also wanted educators and students to share content through the platform.

2. MCISE wants D.lab to remain an in-person training program; they have no desire to deliver D.lab fully virtually in the near future.

MCISE sees the virtual learning platform as a means rather than an end. They hope to use the platform to supplement rather than replace the in-person experience.

3. MCISE hopes that the students who successfully complete the D.lab program will continue to work with the organization and serve as trainers for D.lab and MCISE's other programs.

As MCISE's managing director explained, MCISE currently has only one full-time employee dedicated to Tanara and D.lab. The organization relies on volunteers to complete most

of the training for the Tanara program, and the organization's president serves as the only trainer for the D.lab program. As these programs grow, MCISE hopes to develop a more stable network of trainers. This network would allow the president to step back from running the D.lab program and would provide MCISE with consistent, reliable trainers for Tanara and their other programs. Such a network would also demonstrate the success of MCISE's programs and the positive effects those programs have had on their participants.

4. MCISE is currently constrained by a limited budget and finds fundraising difficult.

MCISE's managing director reiterated several times that raising funds as an NGO in Morocco brings unique challenges. They explained how MCISE strives to collect funds from diverse sources, such as the Moroccan government, wealthy donors, and other organizations, while minimizing burdensome expenses, such as rent. Despite these practices, though, MCISE still struggles to raise enough funds to meet its goals. As mentioned above, MCISE only has one full-time employee dedicated to its training programs. The organization also only has one full-time IT specialist, who is often unable to fulfill MCISE's technological needs.

5. MCISE hopes to package their D.lab program and sell the program's training methodology to universities and other NGOs.

MCISE's managing director and operations director both expressed their desire to see D.lab grow into a program used throughout Morocco and the MENA region. They remarked that, with more resources, they could create a more well-defined curriculum that would help them market the program to other organizations. They explained that the online learning platform is central to their vision as they hope to complete registrations, transactions, scheduling, communication, and other tasks using the platform.

6. MCISE hopes to grow their network of entrepreneurial professionals in the MENA region through D.lab and their other training programs.

As mentioned above, entrepreneurs in the region rely heavily on their personal networks. For example, in the interview, MCISE's managing director shared that MCISE relies on their executive board members' friends and connections to find both employment candidates and sources of funding. Additionally, MCISE relies on social media to grow their network and

expand their influence. The MCISE personnel interviewed saw the virtual D.lab platform in a similar context, as a means for entrepreneurs to connect and share their knowledge and resources.

The second interview was conducted with MCISE's president. The following information was gathered from the interview:

1. D.lab was created to address the need for skilled trainers in the entrepreneurship field.

MCISE's president elaborated on this point by explaining how the people who successfully complete D.lab often continue to work with MCISE as trainers for the organization's other programs, including Tanara. The president also asserted that demand for D.lab has remained high since the program's inception and that the Moroccan government and many NGOs have asked MCISE to share their training methodologies.

2. MCISE sees the virtual D.lab platform as a means rather than an end.

MCISE's president reiterated what the managing director and operations director said in their interview. He expressed his desire to see D.lab grow over the next several years and said that he sees the platform as crucial to that growth. He said that he wants to use the platform to market and sell D.lab, as well as to develop a network of trainers upon which MCISE can rely.

3. MCISE hopes to use the virtual D.lab platform to improve their data collection and analysis.

Currently, MCISE does not have the resources to properly analyze and provide feedback on the work participants complete in their practice hours. The president expressed his wish for the platform to automatically store and analyze information uploaded by the participants. He mentioned his long-term goal of expanding that analysis to achieve a greater understanding of how participants are completing their practice hours and what impact D.lab has on the participants and the participants' trainees.

4. MCISE hopes to use the virtual D.lab platform to both increase the impact of their programs and understand the impact of their programs.

Similar to the managing director and operations director, the president wants the virtual D.lab platform to foster a community of skilled entrepreneurial trainers, working together with MCISE to train more entrepreneurs. MCISE also wants to use the platform as a type of social media, where people can share news and other information about entrepreneurship. The president believes that this will increase the impact of D.lab on its participants and increase the visibility of that impact.

After seeing the current state of the D.lab platform, the president expressed the following requests for the platform:

1. A database in order to keep track of D.lab participant data
2. A way to validate and track practice hours in the platform
3. Testimonies of participants' experience with D.lab and the impact it has made on them
4. A way for trainers to receive feedback as they navigate through the D.lab program
5. French and Arabic languages on the platform at the same time (at the time of the interview, the website could not display two languages simultaneously)

4.2 Objective 2: Investigating Existing Platforms

As mentioned above, consultation with MCISE resulted in a list of key features for the online platform, seven of which were deemed as necessary:

1. Ability to Register
2. Paywall
3. Calendar
4. Discussion Forums
5. Space to Upload Session Content
6. Support for Arabic and French
7. Direct Messaging (DM) System

Six additional features, which were deemed important but not necessary, were also considered:

1. Customizable Appearance
2. General Implementation Time
3. Ease of Maintenance

4. Tech Support Availability
5. Cost
6. Mobile App

The LMS search began with 31 commercially available platforms, which all underwent a preliminary search for necessary features. After the first stage of filtering, only the 12 LMSs that contained all seven essential features remained. Table 1 shows a breakdown of which LMSs contained which essential features. A “Y” means that the LMS has the given feature, while an “N” means that the LMS does not have the given feature.

Table 1: Essential LMS Features

Features	Learning Management Systems																															
	Google Classroom	Moodle	Canvas	Blackboard	Sakai	D2L BS	BNED LC	eFront	Schoology	Edmodo	Skillsoft	Adobe Captivate	Docebo	The Academy	Eliademy	OpenSIS	Chamilo	Litmos	Atutor	IMC Learning Suite	Digital Chalk	itsLearning	LonCapa	OLAT	iCohere	LearnPress	Tutor LMS	Open EDX	Comerstone Platform	Podia	Fresh Learn	
Ability to Register	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Calendar	Y	Y	Y	Y	Y	N	Y	Y	N	N	Y	Y	Y	N	N	Y	Y	Y	N	N	Y	Y	N	Y	N	N	Y	Y	Y	Y	N	N
Pay Wall	N	Y	Y	N	N	N	Y	N	N	N	N	Y	Y	N	N	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	Y	Y	N	Y	Y
Forum for Discussion	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Space for Session Content	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Arabic/French	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	N	N	Y	N	Y	Y	Y	Y	Y	Y	Y

In the second stage of filtering, the 12 LMSs that contained all necessary features were evaluated using a decision matrix (Table 2). A “1” in a given cell means that the feature in the column is at least as important than the feature in the row, while a “0” in a given cell means that the feature in the cell’s row is more important than the feature in its column. After every feature was weighed against every other feature, the total score for each feature was found. Each feature’s total score was then divided by the sum of the scores to determine that feature's weight. The total weight of all features adds up to 1.

Table 2: Decision Matrix

	Customizable Appearance	Implementation Time	Ease of Maintenance	Tech Support Availability	Cost	Mobile App	Total
Customizable Appearance	1	0	0	1	0	0	
Implementation Time	1	1	1	1	1	1	
Ease of Maintenance	1	0	1	1	0	0	
Tech Support Availability	0	0	0	1	0	0	
Cost	1	0	1	1	1	0	
Mobile App	1	0	1	1	1	1	
Sum	5	1	4	6	3	2	21
Weight	23.81%	4.76%	19.05%	28.57%	14.29%	9.52%	100.00%

Each LMS that passed the first phase of screening was rated on a 1 to 5 scale, where 5 is the best score and 1 is the worst, for each feature. To ensure consistency between ratings, guidelines were established to determine what qualified for each score for each feature. Definitions for each score can be found in Table 3.

Table 3: LMS Scoring Guidelines

Features	Definition				
	1	2	3	4	5
Customizable Appearance	Rigid, no customizability	Limited customizability like colors and course picture	Course organization customizability	Minimal customizability restrictions like website layout	Fully Custom
Implementation Time	>Month	Month	Week	Day	Hour
Ease of Maintenance	Instructor needs IT to add every aspect of the course	Instructor can change some things but is very limited	Instructor can do minor changes like course organization but needs IT for anything major	Instructor can change most things but is limited by others	Instructor can easily add and remove content without contacting IT
Tech Support Availability	None	Some features found in the 5 score	About half of the features found in the 5 score	Most of the features found in the 5 score	24/7 Call Center, Video Support (Youtube), User Forums, Online Chat, User Guide
Cost (USD per year)	>= 5000	1000-4999	500-999	1-500	Free
Mobile App	Has no mobile app	N/A	N/A	N/A	Has mobile app

Each LMS’s score for each feature was multiplied by the corresponding feature weight, and the weighted feature scores were then added together to get the final score for that LMS. The weighted scoring for the 12 LMSs that contained all necessary features can be found in Table 4. Like the individual feature scores, the total scores were on a scale of 1 (worst) to 5 (best).

Table 4: LMS Weighted Scoring

Features	Weight	Moodle	Growth Engineering: The Academy	Chamilo	Litmos	Atutor	IMC Learning Suite	Digital Chalk	itsLearning	Tutor LMS	Open EDX	eFront	Canvas Catalog
Customizable Appearance	23.81%	5	5	1	3	4	3	3	2	4	5	5	3
Implementation Time	4.76%	3	2	4	4	3	4	4	4	4	4	3	5
Ease of Maintenance	19.05%	4	5	3	5	3	5	5	5	5	5	3	5
Tech Support Availability	28.57%	5	4	3	2	1	2	2	4	4	3	3	4
Cost	14.29%	5	1	5	1	5	1	4	1	4	3	2	4
Mobile App	9.52%	5	5	5	5	1	5	1	5	1	5	5	5
Total Score	100.00%	4.71	4.00	3.05	3.05	2.76	3.05	3.10	3.38	3.90	4.10	3.52	4.10

After each LMS was scored using the aforementioned system, these results were presented to MCISE, and emphasis was placed on the three platforms deemed most suitable for MCISE: *Moodle*, *Open EDX*, and *Tutor LMS*. While both *Canvas Catalog* and *Growth Engineering: The Academy* scored higher than *Tutor LMS*, they were eliminated from contention. *Canvas Catalog* was eliminated because of a lack of available information regarding its implementation, and *Growth Engineering: The Academy* was eliminated because of its \$30,000 annual cost, which was an extreme outlier among the LMSs. The online learning platform MCISE personnel chose was *Moodle*. A complete list of all LMSs and their respective elimination reasons can be found in Appendix G.

4.3 Objective 3: Effectively Digitizing In-Person Programs

Using results from the previous two objectives and insights from MCISE personnel, the *Moodle* platform was selected. *Moodle* offered a stable and pre-built platform upon which the D.lab platform could be built. Before work began on the website design, new email accounts were created to run the *Moodle* account. A student account and a teacher account were also created and used to test the platform. Initially, the *Moodle* LMS was created on personal

computers to then be later transferred to MCISE’s server. This was done because MCISE’s server could not be accessed.

Once the basic *Moodle* site was created, it was customized to fit MCISE’s needs. Unnecessary tabs were removed and were replaced with the key features MCISE had asked for. For example, the Grades tab was replaced with a discussion board to help facilitate communication between alumni and active students of the program. Once all the key features were added and unnecessary features removed, the layout and presentation of the information was tested with MCISE personnel, as well as with experienced users of online learning platforms.

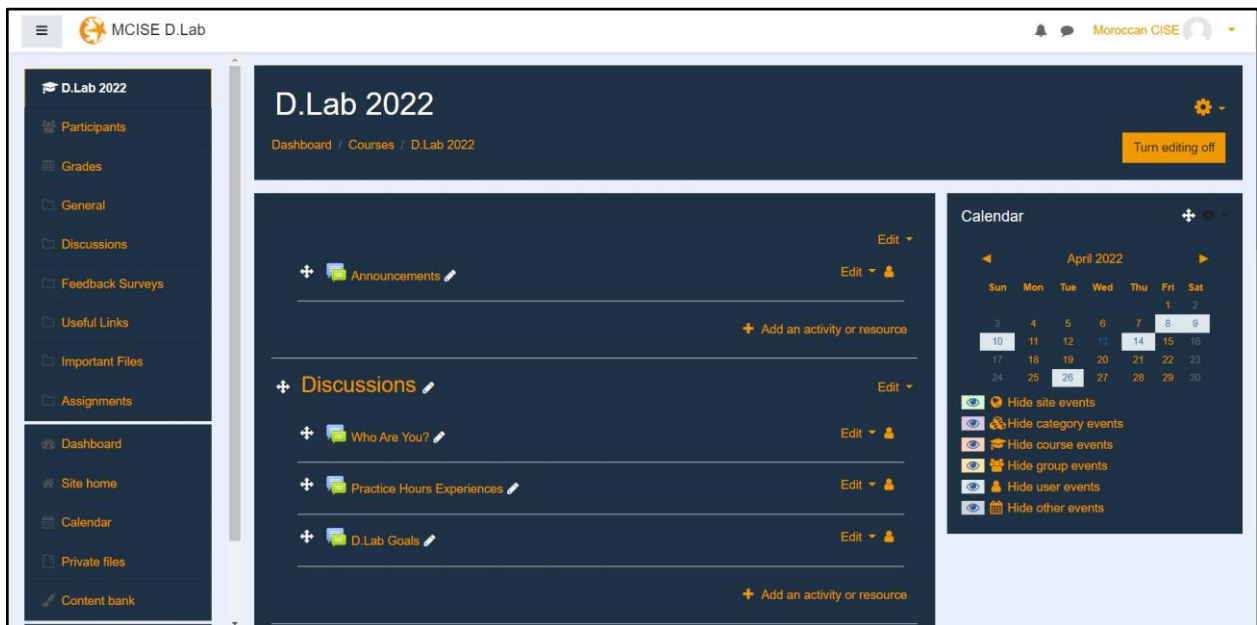


Figure 1: The D.lab Course homepage on the first iteration of the *Moodle* platform.

The first iteration of the platform was then presented to MCISE personnel to gather their feedback and insights. They liked the layout of the course; however, the color scheme of the platform was too dark and they asked to have it changed. An example of the first iteration of the website can be seen above in Figure 1. The second version of the platform can be seen below in Figure 2.

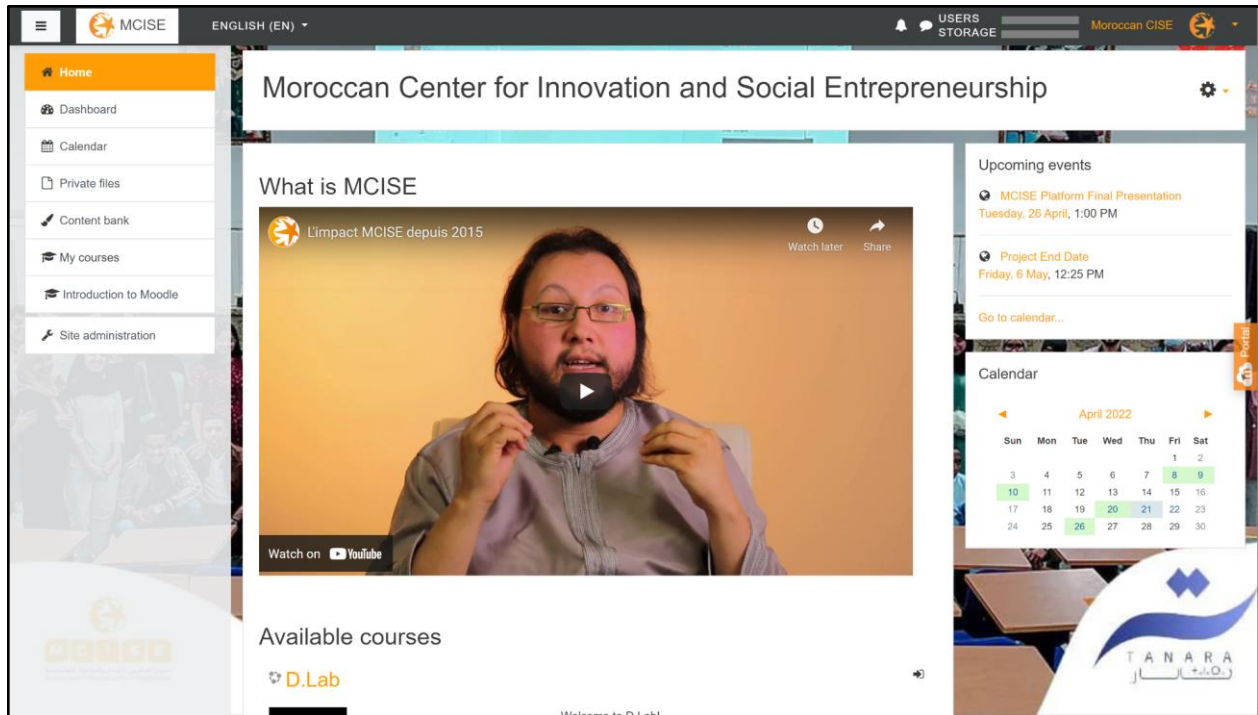


Figure 2: The D.lab Course homepage on the second iteration of the *Moodle* platform.

The second iteration of the platform underwent a heuristic evaluation. In this study, users who had prior experience with LMSs were asked to complete several tasks on the platform before rating the platform on each of Nielsen's 10 Usability Heuristics (1994), which can be seen in Appendix C. Each user rated each heuristic on a scale of 1 (catastrophic problem) to 5 (no problem). The mean and median ratings for each heuristic can be seen in Table 5. Complete survey responses can be found in Appendix H.

Table 5: Mean and Median Heuristic Ratings

Heuristic	Mean	Median
Visibility of System Status	3.85	4
Match Between System and the Real World	4.85	5
User Control and Freedom	4	4
Consistency and Standards	4.45	5
Error Prevention	4.7	5
Recognition Rather Than Recall	3.7	4
Flexibility and Efficiency of Use	3.35	4

Heuristic	Mean	Median
Aesthetic and Minimalist Design	3.1	3
Help Users Recognize, Diagnose, and Recover from Errors	3.74	4
Help and Documentation	3.26	3

The heuristic evaluation revealed that the platform is a good match between the real world and the system. All of the topics made sense to the users, who did not need external help understanding them. Additionally, the *Moodle* site ranked highly in error prevention, meaning that users came across very few errors that would prevent them from moving forward with the tasks. The platform also had room for improvement: it ranked poorly in aesthetic and minimalist design. This showed that more changes were necessary to the platform's design. The platform also suffered from a poor flexibility and efficiency rating. Navigating throughout the site took too much time, as users needed to navigate back to the course homepage before beginning each new task.

Using these suggestions and the heuristic evaluation, the platform was redesigned for the third and final interaction, which can be seen below in Figure 3. In this iteration, the course topics were added to the navigation bar on the left-hand side of the screen. This allows users to quickly jump from one topic to another and eliminates the need to go back to the homepage after every task. The background image was removed from the platform and replaced by a solid color to avoid making the background too distracting for users. Finally, the homepage the user first sees when they open the platform was changed to the dashboard. This change allows the user to more quickly see what courses they are enrolled in and spend less time searching on the homepage.

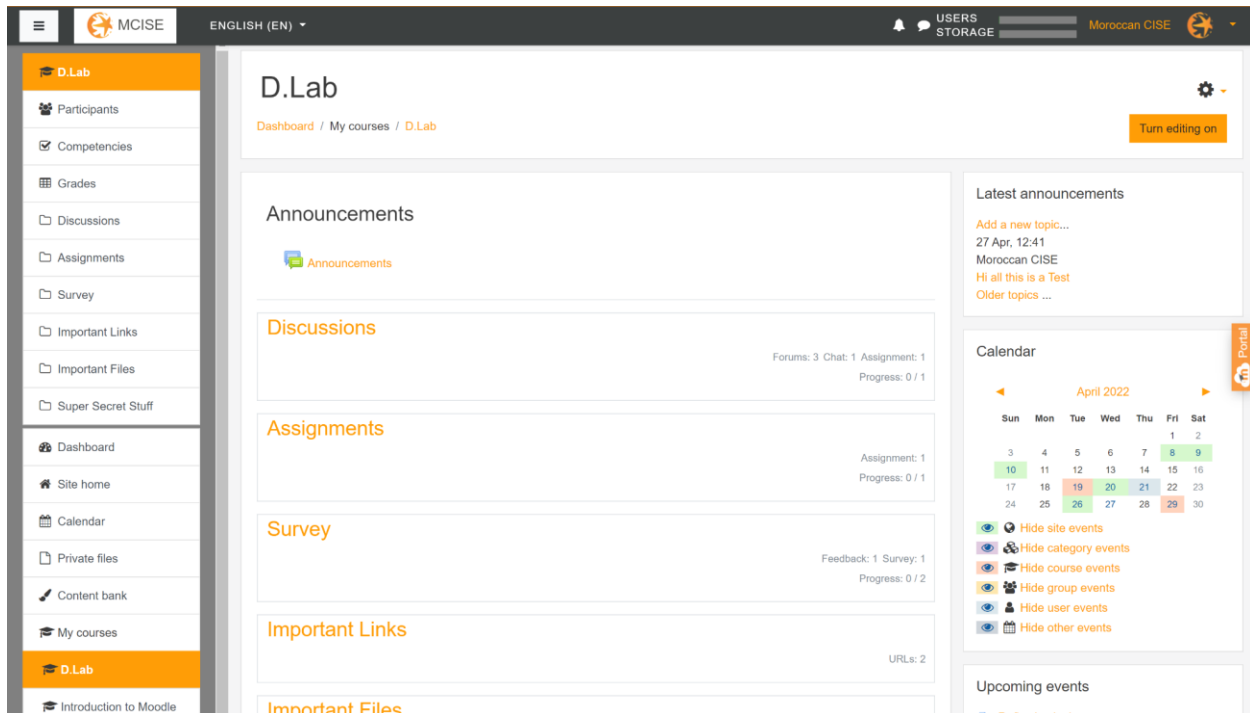


Figure 3: The D.lab Course homepage on the final iteration of the *Moodle* platform.

4.4 Objective 4: Platform Management

During the creation of the platform, our team created a user guide to keep track of important login information as well as basic ways to navigate the course content and change course appearance. As *Moodle* is a well-documented software, the user guide was meant to be a brief guide and only covers the specific features and tasks deemed most relevant to MCISE. Additional resources, such as the *Moodle* administrator user guide, *Moodle* teacher user guide, and *Moodle* YouTube tutorials, were appended in the user guide. The user guide ensures a seamless transition of the platform to MCISE after the completion of the project. A copy of the user guide can be found in Appendix I.

5. DISCUSSION AND RECOMMENDATIONS

5.1 Discussion

Our survey had a lower response rate than expected; only four responses were received. This lack of responsiveness may be due to email not being a preferred form of communication in Morocco. Because of the survey's low response rate, we took care to not let the survey results influence the platform too heavily. While the respondents answered questions consistently, they represent a small portion of D.lab participants, and a larger pool of participants may reveal a wider range of opinions. The lack of responsiveness also causes concern about the interactiveness of the D.lab virtual platform. The platform will not be a successful networking space unless participants are active and willing to use it.

Our interviews with MCISE personnel revealed important, and often unexpected, information about MCISE's motives and their goals for the D.lab platform. We were surprised to learn that MCISE had no intention of offering D.lab in a virtual format and that they prioritized the networking aspects of the platform over the ability to present content virtually. We learned that MCISE hopes to use D.lab and the platform to develop a pool of skilled trainers that MCISE can use to run their other programs. These lessons guided the design of the *Moodle*-based platform, which was stripped of some traditional features so that more communication-focused features could be added. We also learned that MCISE hopes to use the platform to collect and analyze data about the D.lab participants and their trainees. Such analysis capabilities were beyond the scope of this project, but we discussed with MCISE how they could possibly add those capabilities in the future.

Investigating the existing platforms gave the team insight into the many learning management systems available and how they might be a fit for MCISE. The initial list was based on previous knowledge and work. By beginning the filtering stage according to MCISE's necessary features, the platform choice was immediately tailored to our sponsor's needs. The second stage of narrowing down the list of potential LMSs allowed us to choose a platform that was not only practical, but of added value to MCISE. The third stage of choosing a platform consisted of direct communication with our sponsor, allowing them to be fully involved in the

decision. These guidelines were set in place so that a platform could be chosen that is unique to our client's needs and our time researching was productive. There was no need to spend time researching platforms in depth if they did not meet MCISE's needs. In-depth research revealed that many platforms were suited for larger companies only. While MCISE hopes to expand widely, the current state of D.lab (approximately 20 participants) was considered for platform choice. The final decision, *Moodle*, was the right choice for MCISE. Extensive customizability features, tech support, and online user resources will provide an easy transition of the platform from our team to MCISE personnel and allow the platform to easily change as D.lab and MCISE expand. Since *Moodle* is a free, open-source platform, MCISE will be able to utilize the platform through any and all budget changes. MCISE will be able to maintain the platform as long as they are able to dedicate a small amount of IT resources to it.

The heuristic evaluation revealed interesting information about the usability of our platform. Despite all users having experience with LMSs, many struggled to navigate the platform and find key features. Some of this problem can be solved by structuring the course more intuitively, but some of this problem is inherent to *Moodle* and thus beyond our control. Additionally, many users reported disliking the aesthetics of the platform. We took the users' suggestions and adjusted the platform's appearance to make it more aesthetically pleasing, but, as the heuristic evaluation showed, creating a pleasing user interface is difficult, and MCISE will likely have to continue tweaking the platform to optimize its appearance.

While the platform we delivered to MCISE contains almost all the desired features, we did not enable the paywall. *Moodle* comes with a PayPal plugin that administrators can use to monetize their courses, but MCISE does not have a PayPal account and was unwilling to share the banking information required to create one. MCISE currently collects most payments through check or bank transfer and will continue to do so for the foreseeable future.

5.2 Recommendations

We recommend that MCISE **hire a new IT staff to improve the platform functionality and usability**. The platform is currently hosted on *MoodleCloud*, which is *Moodle's* official hosting service. However, the platform is only free for 45 days before a paid subscription starts. MCISE will need to pay for *MoodleCloud* or migrate D.lab to their in-house server to continue

hosting the platform. With the current absence of any IT personnel, MCISE does not have the necessary human resources to maintain the platform. Additionally, the platform currently only contains basic features; an IT staff member could add additional plug-ins and features to further improve the platform.

We recommend that MCISE **gradually transfer the teaching responsibilities of the D.lab program away from the president.** D.lab is currently run and taught solely by MCISE's president. As the D.lab program expands, MCISE should gradually transfer responsibilities away from the president; some responsibilities can be automated by our virtual learning platform, and others can be completed by another D.lab trainer. These recommendations would not only lessen the overwhelming responsibilities placed on the president, but also allow MCISE greater capacity for growth and profit from D.lab.

We recommend that MCISE **have a consistent curriculum and adjust their marketing strategies.** As MCISE grows their program to reach other NGOs, corporations, and governments, they will adjust D.lab's curriculum and their marketing strategies. They would need to standardize the current curriculum to be more consistent and shorten the training period to attract busy audiences, such as executives and consultants. While the essence of the D.lab program is to "change your mindset," it is also important for MCISE to branch out from that marketing approach to more data-driven strategies. Data such as the number of people who started a business after D.lab, those participants' portfolios and testimonies, or research on social entrepreneurship would be invaluable information to demonstrate D.lab's impact. This information would convince more organizations to participate in D.lab, leading to more participants and faster expansion.

We recommend that MCISE **invest in efforts to increase their funding.** MCISE personnel repeatedly expressed to us their desire to expand their programs to reach more people in Morocco and throughout the MENA region. However, they are severely limited by budgetary restrictions and rely on volunteers for much of their work. MCISE needs more full-time employees dedicated to improving the quality and scalability of their programs before they will be able to expand.

We recommend that MCISE **provide training materials to every user of the Moodle platform**. The heuristic evaluation demonstrated that even experienced users may struggle to navigate the platform, and the literature reports that students in online courses often suffer because of a lack of technical support (Pardino et al., 2018). Fortunately, a wealth of resources is available to MCISE's users, including the user guide we produced, instructional videos produced by *Moodle*, and a plethora of guides produced by *Moodle*.

5.3 Conclusion

As Moroccan unemployment continues to rise, NGOs are providing training programs that teach people skills to succeed in a difficult economy, many of which focus on social innovation and entrepreneurship training. These social innovation and entrepreneurship programs aim to teach people economic self-sufficiency while creating more jobs and positively impacting the community. Conventionally, these programs are delivered in an in-person format. However, COVID-19 and online learning have shifted this perspective, and NGOs such as MCISE began recognizing the benefits of digitizing their program. Having already created a virtual platform for their Tanara program, MCISE is hoping to supplement more of their programs with virtual offerings. Specifically, MCISE wanted a virtual platform to support D.lab, a unique program that trains people to teach entrepreneurship.

Through this project, we created a virtual learning platform for D.lab that provided an engaging educational experience for trainers so that their students will be inspired to learn the importance of social entrepreneurship and innovation. The platform is easy to use and engage with, and it will be used long after the project's completion. Interviews with D.lab's participants and creators and an investigation of existing platforms provided the base of knowledge for MCISE's specific needs and resources for the platform. This knowledge ensured that our team was ready to implement a platform. The platform, once implemented, underwent a heuristic evaluation, which revealed that it was mostly effective but had some issues with aesthetics and ease of use. We used feedback from that evaluation to improve the platform before delivering it to MCISE. A user guide for the platform was created and presented to MCISE as well to mitigate any issues that may occur with the program after the project's completion.

Though the unemployment rate in Morocco will not shift with the click of a button, we hope that the virtual D.lab platform will engage professionals wanting to train novice entrepreneurs, increasing the impact of their training and the success of the trainees. We hope that trainers enrolled in D.lab will feel motivated to inspire their students because inspired teachers bring inspired students.

THIS SPACE
IS
INTENTIONALLY
LEFT
BLANK

6. REFERENCES

- Abrami, P. C., Bernard, R. M., Bures, E. M., Borokhovski, E., & Tamim, R. M. (2011). Interaction in distance education and online learning: Using evidence and theory to improve practice. *Journal of Computing in Higher Education*, 23(2).
<https://doi.org/10.1007/s12528-011-9043-x>
- Amraoui, B., Ouhajjou, A., Monni, S., El Amrani, N., Idrissi, A., Tvaronaviciene, M., Mohammed, S., & Abdallah, B. (2019). Performance of clusters in Morocco in the shifting economic and industrial reforms. *Insights into Regional Development*, 1.
<https://doi.org/10.9770/IRD>
- Becheikh, N. (2021). Political stability and economic growth in developing economies: Lessons from Morocco, Tunisia and Egypt ten years after the Arab Spring. *Insights into Regional Development*, 3(2). [https://doi.org/10.9770/IRD.2021.3.2\(5\)](https://doi.org/10.9770/IRD.2021.3.2(5))
- Bernard, R. M., Abrami, P. C., Borokhovski, E., Wade, C. A., Tamim, R. M., Surkes, M. A., & Bethel, E. C. (2009). A Meta-Analysis of Three Types of Interaction Treatments in Distance Education. *Review of Educational Research*, 79(3).
<https://doi.org/10.3102/0034654309333844>
- Bolliger, D. U. (2004). Key Factors for Determining Student Satisfaction in Online Courses. *International Journal on E-Learning*, 3(1).
- Chaibate, H., Hadek, A., Ajana, S., Bakkali, S., & Faraj, K. (2019). A Comparative Study of the Engineering Soft Skills Required by Moroccan Job Market. *International Journal of Higher Education*, 9(1), <https://doi.org/10.5430/ijhe.v9n1p142>
- Canada, K. E., Freese, R. A., Bailey, R. M., & Fitch, D. (2021). Evaluating Learning Outcomes and Assessing Social Work Skill Development: Comparing Online vs. In-Person Education. *Journal of Technology in Human Services*.
<https://doi.org/10.1080/15228835.2021.1997693>
- Carrillo, C., & Flores, M. A. (2020). COVID-19 and teacher education: A literature review of online teaching and learning practices. *European Journal of Teacher Education*, 43(4). Scopus. <https://doi.org/10.1080/02619768.2020.1821184>
- Castro, M. D., & Tumibay, G. (2021). A literature review: Efficacy of online learning courses for higher education institution using meta-analysis. *Education and Information*

- Technologies*, 26. <https://doi.org/10.1007/s10639-019-10027-z>
- Chang, C.-L., & Fang, M. (2020). *E-Learning and Online Instructions of Higher Education during the 2019 Novel Coronavirus Diseases (COVID-19) Epidemic*. 1574(1). <https://doi.org/10.1088/1742-6596/1574/1/012166>
- Cirulli, F., Elia, G., Lorenzo, G., Margherita, A., & Solazzo, G. (2016). The use of MOOCs to support personalized learning: An application in the technology entrepreneurship field. *Knowledge Management and E-Learning*, 8(1).
- El Fasiki, H. (2013, August 26). *Why Social Entrepreneurship in Morocco is Getting Harder to Do? And what is the Current Debate?* https://advance.lexis.com/document/searchwithindocument/?pdmfid=1516831&crd=077490a0-bbea-455b-a887-02c5ee96f816&pdsearchwithinterm=moroccan+center&pdworkfolderlocatorid=NOT_SAVED_IN_WORKFOLDER&ecomp=sswvk&priid=dc5ff8a1-9ab2-4e79-9838-a20356365c05
- Elmuti, D., Khoury, G., & Omran, O. (2012). Does entrepreneurship education have a role in developing entrepreneurial skills and ventures' effectiveness? *Journal of Entrepreneurship Education*, 15.
- Fakhreddine, O., Yamani, N., & Berrada, K. (2018). Enrollment in entrepreneurship MOOCs: Motives of Moroccan postgraduate degree students. *Journal of Applied Research and Technology*, Vol N°1.
- Fleming, N. D. (1995). *I'm different; not dumb Modes of presentation (V.A.R.K.) in the tertiary classroom*.
- Gray, K. R. (2001). Women entrepreneurs in Morocco: A preliminary investigation. *The Journal of North African Studies*, 6(4). <https://doi.org/10.1080/13629380108718451>
- Hassan, M. A., Habiba, U., Majeed, F., & Shoaib, M. (2021). Adaptive gamification in e-learning based on students' learning styles. *Interactive Learning Environments*, 29(4). <https://doi.org/10.1080/10494820.2019.1588745>
- Kabbaj, M., El Ouazzani Ech Hadi, K., Elamrani, J., & Lemtaoui, M. (2016). A Study of the Social Entrepreneurship Ecosystem: The Case of Morocco. *Journal of Developmental Entrepreneurship*, 21(4), <https://doi.org/10.1142/S1084946716500217>
- Kalafatoglu, T., & Mendoza, X. (2017). The impact of gender and culture on networking and

- venture creation. *Cross Cultural & Strategic Management*, 24(2).
<https://doi.org/10.1108/CCSM-04-2016-0090>
- Kemp, N., & Grieve, R. (2014). Face-to-face or face-to-screen? Undergraduates' opinions and test performance in classroom vs. online learning. *Frontiers in Psychology*, 5.
<https://www.frontiersin.org/article/10.3389/fpsyg.2014.01278>
- Maliari, M., Azyat, A., Achhab, N. B., Raissouni, N., & Chahboun, A. (2021). Spatial Accessibility of Urban Parks in Tangier City, Morocco. *The International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences*, XLVI-4/W5-2021,
<http://dx.doi.org/10.5194/isprs-archives-XLVI-4-W5-2021-369-2021>
- Martin, F., & Bolliger, D. U. (2018). Engagement Matters: Student Perceptions on the Importance of Engagement Strategies in the Online Learning Environment. *Online Learning*, 22(1). <https://doi.org/10.24059/olj.v22i1.1092>
- McSweeney, M. J. (2020). Returning the 'social' to social entrepreneurship: Future possibilities of critically exploring sport for development and peace and social entrepreneurship. *International Review for the Sociology of Sport*, 55(1).
<https://doi.org/10.1177/1012690218784295>
- Means, B., & Neisler, J. (2021). Teaching and Learning in the Time of COVID: The Student Perspective. *Online Learning*, 25(1), Article 1. <https://doi.org/10.24059/olj.v25i1.2496>
- Miller, W. W., & Webster, J. K. (1997). *A Comparison of Interaction Needs and Performance of Distance Learners in Synchronous and Asynchronous Classes*.
<https://eric.ed.gov/?id=ED415411>
- Mukhtar, K., Javed, K., Arooj, M., & Sethi, A. (2020). Advantages, limitations and recommendations for online learning during covid-19 pandemic era. *Pakistan Journal of Medical Sciences*, 36(COVID19-S4). <https://doi.org/10.12669/pjms.36.COVID19-S4.2785>
- Naderi, N., Khosravi, E., Azadi, H., Karamian, F., Viira, A.-H., & Nadiri, H. (2020). Barriers to Developing Social Entrepreneurship in NGOs: Application of Grounded Theory in Western Iran. *Journal of Social Entrepreneurship*, 0(0).
<https://doi.org/10.1080/19420676.2020.1765409>
- Pardino, A., Gleyzer, I., Javed, I., Reid-Hector, J., & Heuer, A. (2018). The Best Pedagogical Practices in Graduate Online Learning: A Systematic Review. *Creative Education*, 9(7).

<https://doi.org/10.4236/ce.2018.97083>

- Roblyer, M. D., & Ekhaml, L. (2000). How Interactive are YOUR Distance Courses? A Rubric for Assessing Interaction in Distance Learning. *Online Journal of Distance Learning Administration*, 3(2). <https://www.westga.edu/~distance/ojdla/summer32/roblyer32.html>
- Roddy, C., Amiet, D. L., Chung, J., Holt, C., Shaw, L., McKenzie, S., Garivaldis, F., Lodge, J. M., & Mundy, M. E. (2017). Applying Best Practice Online Learning, Teaching, and Support to Intensive Online Environments: An Integrative Review. *Frontiers in Education*, 2. <https://www.frontiersin.org/article/10.3389/feduc.2017.00059>
- Schäfer, I., Henze, V., Silveira, C., Lührmann, A., Biegler-König, C., Farrell, D., Bocu, G., Bartels, I., Hamdouch, B., & Hong, W. M. (2015). *Youth, Revolt, Recognition—The Young Generation During And After The “Arab Spring”*.
- Schrenk, N., Alves, K., Schrenk, B., & Dam, D. V. (2021). Reflecting on Best Practices for Online Learning in a Post-COVID-19 World. *Online Learning*, 25(4), Article 4. <https://doi.org/10.24059/olj.v25i4.2460>
- Secundo, G., Mele, G., Vecchio, P. D., Elia, G., Margherita, A., & Ndou, V. (2021). Threat or opportunity? A case study of digital-enabled redesign of entrepreneurship education in the COVID-19 emergency. *Technological Forecasting and Social Change*, 166. <https://doi.org/10.1016/j.techfore.2020.120565>
- Statista. (2020, September). Morocco: Adult literacy rate in Morocco from 1982 to 2018. <https://www-statista-com.ezpv7-web-p-u01.wpi.edu/statistics/1171965/adult-literacy-rat-in-morocco/>
- Tamm, S. (2021, January 21). All 10 Types of E-Learning Explained. *E-Student*. <https://e-student.org/types-of-e-learning/>
- Ward, M. E., Peters, G., & Shelley, K. (2010). Student and faculty perceptions of the quality of online learning experiences. *The International Review of Research in Open and Distributed Learning*, 11(3). <https://doi.org/10.19173/irrodl.v11i3.867>
- World Bank (2014) *Breaking_the_barriers_to_youth_inclusion_eng.pdf*. https://www.worldbank.org/content/dam/Worldbank/document/MNA/tunisia/breaking_the_barriers_to_youth_inclusion_eng.pdf
- Yemini, M., & Sagie, N. (2015). School–Nongovernmental Organization Engagement as an Entrepreneurial Venture: A Case Study of Sunlight’s Engagement With Israeli Schools.

Educational Administration Quarterly, 51(4).

<https://doi.org/10.1177/0013161X14540171>

Zali, M. R., Bastian, B. L., & Qureshi, S. (2013). Promoting innovation in the MENA region: The role of social norms and individual factors in entrepreneurial networks. *International Journal of Business and Globalisation*, 11(4), <https://doi.org/10.1504/IJBG.2013.056877>

THIS SPACE
IS
INTENTIONALLY
LEFT
BLANK

APPENDIX A: MOROCCAN CENTER OF SOCIAL INNOVATION AND ENTREPRENEURSHIP

The Moroccan Center of Social Innovation and Entrepreneurship (MCISE) was founded in 2012 by a group of young people passionate about supporting entrepreneurs and finding solutions to social challenges in Morocco. Based in Rabat, MCISE has expanded and provided services to many Moroccans, from high school students without any exposure to entrepreneurship, to entrepreneurs who are just starting out, to executives with many years of experience. While teaching people invaluable skills to generate and execute their ideas, MCISE fosters a tightly-knit community for learning and for exchanging ideas. This NGO is one of the top organizations spearheading the growth in the Moroccan entrepreneurship training sector. One of the programs that specifically contributes to entrepreneurship training in Morocco is MCISE's D.lab program. D.lab trains people to teach entrepreneurship skills and provides them with the best tools and frameworks to accomplish this task.

**THIS SPACE
IS
INTENTIONALLY
LEFT
BLANK**

APPENDIX B: D.LAB PARTICIPANT SURVEY QUESTIONS

Preamble

We are a group of students from Worcester Polytechnic Institute in Worcester, Massachusetts in the USA. We are working with the Moroccan Center for Innovation and Social Entrepreneurship to develop a virtual learning platform to teach entrepreneurship pedagogy in Morocco. Currently, we are conducting a survey of current and previous D.lab participants to understand their perspectives about the program and identify aspects of the program that should be preserved in the program's online format. Your participation in this survey is completely voluntary. Please remember that your answers will remain anonymous. No names or other identifying information will appear in any of the project reports or publications. Please contact hmwagner@wpi.edu if you have any questions.

Section 1

1. What do you do for a living?
2. In your work, what type of people do you interact with? (for example: students in a rural college)

Section 2

3. Why did you enroll in D.lab?
4. Rate the D.lab program from 1 (extremely difficult to complete) to 7 (extremely easy to complete).
5. Optional: Please explain your answer.
6. Rate the D.lab program from 1 (not engaging at all) to 7 (extremely engaging).
7. Optional: Please explain your answer.
8. How much did the D.lab program interfere with your job and other life commitments?
Give your answer on a scale of 1 (no interference) to 7 (drastic interference).
9. Optional: Please explain your answer.
10. Rate the D.lab program's pace on a scale of 1 (way too fast) to 7 (way too slow).
11. Optional: Please explain your answer.
12. What is the most important thing that you've learned from D.lab?

Section 3

13. Have you ever taken an online course before?
14. If you have taken an online course before, what platform was it on (*Canvas, Google Classroom, Moodle, Blackboard, etc.*)?
15. If you have taken an online course before, what did you like about the course?
16. If you have taken an online course before, what did you dislike about the course?
17. If you were to enroll in D.lab again, how likely would you be to choose to enroll in an online version of the program? Please give your answer on a scale of 1 (not at all likely) to 7 (extremely likely).
18. Optional: Please explain your answer.
19. Which aspects of the in-person D.lab program do you think would be the most challenging to preserve in an online version of the program?
20. Which aspects of the in-person D.lab program would be the most important to include in an online version of the program?
21. Which aspects of the in-person D.lab program should not be included in an online version of the program?
22. Would you be interested in other complementary/in-depth/follow-up programs from D.lab?

APPENDIX C: HEURISTIC EVALUATION PROCEDURE AND SURVEY

Preamble

We are a group of students from Worcester Polytechnic Institute in Worcester, Massachusetts in the USA. We are working with the Moroccan Center for Innovation and Social Entrepreneurship to develop a virtual learning platform to teach entrepreneurship pedagogy in Morocco. Currently, we are conducting a heuristic evaluation with participants who have experience using virtual learning platforms to understand whether our platform is usable and how we can improve our platform. Your participation in this interview is completely voluntary. You may withdraw at any time. Your answers will remain anonymous. No names or other identifying information will appear in any of the project reports or publications. Please contact hmwagner@wpi.edu if you have any questions.

For Teachers

Please log in using the username and password given to you.

Please complete all of the following tasks. You do not have to complete the tasks in order.

1. Post a message in the discussion forum.
2. Send a private message to a student.
3. Make a survey.
4. Create an assignment.
5. Respond to somebody else's post in the discussion forum.
6. Grade an assignment.
7. Navigate to the MCISE homepage. This is a separate website that can be reached through this platform.
8. Add an event to the calendar.

If you finish all of the tasks with time to spare, explore the rest of the platform to see what else you can do with it.

After the time to explore the platform is complete, please fill out the provided survey.

For Students

Please log in using the username and password given to you.

Please complete all of the following tasks. You do not have to complete the tasks in order.

1. Post a message in the discussion forum.
2. Send a private message to the MCISE teacher.
3. Take a survey.
4. Respond to somebody else's post in the discussion forum.
5. Submit an assignment.
6. Navigate to the MCISE homepage. This is a separate website that can be reached through this platform.
7. Add an event to the calendar.

If you finish all of the tasks with time to spare, explore the rest of the platform to see what else you can do with it.

After the time to explore the platform is complete, please fill out the provided survey.

Survey

Introductory Questions (multiple choice)

1. What role did you have while participating?
 - a. Teacher
 - b. Student
2. Have you used *Moodle* before?
 - a. Yes, as a student
 - b. Yes, as a teacher
 - c. Yes, as a teacher and a student
 - d. No

Heuristics (5-point scale)

Please rank the following 10 heuristics from 1 (catastrophic problem) to 5 (no problem) based on your experience with the D.lab platform.

3. **Visibility of System Status:** Did you feel that you received adequate feedback from interactions/clicks? Are there visual cues that make you feel like you are on the right track?
4. **Match Between System and the Real World:** Do you feel comfortable and familiar with the language on this platform? Did you have to look up any definitions?
5. **User Control and Freedom:** Did you find it easy to go back if you clicked the wrong thing or made a mistake?
6. **Consistency and Standards:** Did you find this platform consistent in language and look?
7. **Error Prevention:** Did you come across any errors?
8. **Recognition Rather Than Recall:** Did you feel that you could recognize relevant information or you had to recall it from memory?
9. **Flexibility and Efficiency of Use:** How efficiently did you find this platform? Was it hard to navigate?
10. **Aesthetic and Minimalist Design:** Did you find the design of the platform engaging and aesthetically pleasing to look at?
11. **Help Users Recognize, Diagnose, and Recover from Errors:** If you ran across an error, was it easily explained to you?
12. **Help and Documentation:** If you had trouble completing a task, how easily were you able to find documentation or instruction to help?

Free Response Questions

13. Please explain any errors faced.
14. If you would like to explain your answers to any of these questions, please do so here.
15. If you would like to express overall comments or concerns about the platform, please do so here.

APPENDIX D: D.LAB PARTICIPANT SURVEY RESPONSES

The following table lists the survey questions and the four responses to each question. The questions were translated into French by MCISE personnel before being sent to participants. The responses were translated from French to English by MCISE personnel. Blank entries in the table indicate that the participant left that question blank.

Question	Response 1	Response 2	Response 3	Response 4
What do you do for a living?	As of 16/08/2021, I am retired after a career of 34 years in finance.	Professor	In finances	Trainer
In your work, what type of people do you interact with? (for example: students in a rural college)	I interacted with clientele, my colleagues at the office and my network. I have also provided many training cycles.	High school students	Individuals and professionals	Project holders, women in rural areas, students...
Why did you enroll in D.lab?	To be able to provide trainings in entrepreneurship.	To be a facilitator/trainer	To expand my knowledge in social entrepreneurship	To deepen my knowledge in social entrepreneurship and accompagnement methodology for project holders.
Rate the D.lab program from 1 (extremely difficult to complete) to 7 (extremely easy to complete).	6	6	6	6

Question	Response 1	Response 2	Response 3	Response 4
Optional: Please explain your answer.	Extremely easy to complete as long as you're passionate, persevering and rigorous.	The simulation techniques and the exercises given by the trainer makes the program easier and more interesting.		The program is very enriching that requires hours of field practice on the taught methodology. It's still easy to complete providing you follow through and apply the teachings.
Rate the D.lab program from 1 (not engaging at all) to 7 (extremely engaging).	7	6	6	7
Optional: Please explain your answer.	Extremely engaging in terms of themes covered and applied methodology.			The methodology is very creative and pushes trainers to be more involved to understand the process and benefit from the teachings.
How much did the D.lab program interfere with your job and other life commitments? Give your answer on a scale of 1 (no interference) to 7 (drastic interference).	6	6	6	7
Optional: Please explain your answer.	Drastic impact, the program is exciting and the methodology is very impactful.			Seeing things from a different perspective, incorporating the social aspect, and understanding how large the spectrum of possibilities is.

Question	Response 1	Response 2	Response 3	Response 4
Rate the D.lab program's pace on a scale of 1 (way too fast) to 7 (way too slow).	5	6	4	5
Optional: Please explain your answer.	The pace of the program is moderate. It is constituted of 2 axes, group learning and field practice.			I think a weekend of training followed by 4 weeks of field practice is a reasonable plan.
What is the most important thing that you've learned from D.lab?	The methodology		Codesign and codevelopment of workshops	Thinking and pushing people to think.
Have you ever taken an online course before?	Yes	Yes	Yes	Yes
If you have taken an online course before, what platform was it on (<i>Canvas, Google Classroom, Moodle, Blackboard, etc.</i>)?	Customized	<i>Google Classroom, Moodle</i>	<i>Zoom</i>	Fun mooc
If you have taken an online course before, what did you like about the course?	Flexibility, interaction between mentors and mentees, interaction between mentees.	Design, duration, easin	Design, easiness	Duration, easiness, flexibility
If you have taken an online course before, what did you dislike about the course?	Connectivity issues.	Interactions between mentor and mentees, Interactions between mentees	Interactions between mentees	Interactions between mentor and mentees

Question	Response 1	Response 2	Response 3	Response 4
If you were to enroll in D.lab again, how likely would you be to choose to enroll in an online version of the program? Please give your answer on a scale of 1 (not at all likely) to 7 (extremely likely).	6	5	4	4
Optional: Please explain your answer.	While maintaining field practice.			Having the same interaction between the trainer and the trainees is important if I were to attend it virtually.
Which aspects of the in-person D.lab program do you think would be the most challenging to preserve in an online version of the program?	The human interactions	Prototyping aspect, the deliverables, "open space of technologies"	Human interaction	No aspect is difficult, all the program can be adapted to a digital version.
Which aspects of the in-person D.lab program would be the most important to include in an online version of the program?	Group exercises	"Open Space of technologies", The animation session simulations by the facilitators	Animation improvisation	The ideation part is the most important one because it triggers the mindset change process.
Which aspects of the in-person D.lab program should not be included in an online version of the program?		"Open space of technologies"	Nothing	The entire program should be included because it is an entire logical process.

Question	Response 1	Response 2	Response 3	Response 4
Would you be interested in other complementary/in-depth/follow-up programs from D.lab?	Yes	Yes	Yes	Yes

THIS SPACE
IS
INTENTIONALLY
LEFT
BLANK

APPENDIX E: MCISE MANAGING DIRECTOR AND PROJECT COORDINATOR INTERVIEW SUMMARY

Date: Thursday, April 14, 2022

Time: 1:00-2:00 PM

Attendance:

MCISE Platform Team: Christopher DeMaio, Elisabeth Lynn, Vy Tran, Hunter Wagner

MCISE Expansion Team: Jacob Mills, MC Shea, Khushi Soni

MCISE Managing Director: Nisrine Ouazzani Chahdi

MCISE Operations Director: Zahra Nafaa

Preamble

We are an undergraduate student team from the Worcester Polytechnic Institute in Worcester, MA, USA, working with MCISE to implement a virtual platform to supplement MCISE's in-person D.lab program. We want to ask you about your experiences and long term goals for D.lab so we can understand how to best implement the platform and transition it to MCISE after it is completed.

The following questions were asked to MCISE's Managing Director and Operations Director. Notes about their responses are listed under each question.

1. What is your role/experience in running Dlab?
 - a. Created 4 years ago
 - b. To help get more trainers
 - c. 70% of trainers for other MCISE programs were from D.lab
 - d. Trainers are entrepreneurs themselves and have often been through other MCISE programs
 - e. MCISE needs more trainers (around 50)
2. How do you see an online platform helping the running of D.lab?
 - a. Need for paywall

- b. Need for online registration
 - c. Need for online shareable calendar
 - i. See availability of participants
 - d. Need for discussion forums
 - e. See what is happening with everybody
 - i. Alumni story highlights
 - f. Ability to see MCISE's impacts
 - g. See people's profiles
 - h. Connect via groups
 - i. Help Students become Trainers
3. What do you want to get out of the online D.lab Platform?
 - a. Sell to other organizations
 - b. Network of entrepreneurs and trainers
 4. What lessons have you learned from the creation of the online Tanara program?
 - a. Scalability
 - b. Access
 - c. Library of data to look back on
 5. Where do you feel D.lab has room to improve?
 - a. Need to create an academy of trainers
 - b. Reach other associations' needs
 - c. MCISE wants to sell the D.lab training
 - d. Fundraising
 - e. Better acknowledge cultural differences among participants
 6. What is your vision of the D.lab program 5 years from now?
 - a. Create a network of people
 - b. Understand the needs of the people
 - c. See a university recognize the course or partner with MCISEE to deliver the course
 - d. 50 D.lab students that become trainers so the president can step back
 - e. More in depth training after D.lab
 - f. New means of delivery

- g. Possibly fully online D.lab training
 - i. MCISE personnel have conveyed conflicting opinions
- 7. How does MCISE validate the students' work?
 - a. Communication
 - b. Template to fill out with the trainees
 - c. Social media posts
- 8. Does "selling the formula" mean people coming to MCISE to train or selling a methodology to other organizations?
 - a. Methodology
 - b. Selling "how" to achieve desired results
 - c. D.lab has one set methodology

The MCISE Expansion Team proceeded to ask their questions, which were not relevant to this project, and the interview concluded.

APPENDIX F: MCISE PRESIDENT INTERVIEW SUMMARY

Date: April 20, 2022

Time: 3-4:30 PM

Attendance:

MCISE Platform Team: Christopher DeMaio, Elisabeth Lynn, Vy Tran, Hunter Wagner

MCISE Expansion Team: Jacob Mills, MC Shea, Khushi Soni

MCISE President: Adnane Addioui

Preamble

We are an undergraduate student team from the Worcester Polytechnic Institute in Worcester, MA, USA, working with MCISE to implement a virtual platform to supplement MCISE's in-person D.lab program. We want to ask you about your experiences and long term goals for D.lab so we can understand how to best implement the platform and transition it to MCISE after it is completed.

The MCISE Platform Team presented *Moodle* to the MCISE President for his feedback, which is given below.

Assignments Section:

- Need to capture data about trainees' work
- Important for tracking progress and fulfilling requirements
- Database that can connect with people who need/are offering training

Language

- For user-generated content, enter words in both French and Arabic
- No need to make the user switch the settings

The MCISE Expansion team discussed their work.

The following questions were asked to MCISE’s President. Notes about their responses are listed under each question.

1. Why did you create D.lab?
 - a. Develop mentorship skills (‘huge need’)
 - b. Needs content for consistent training
 - c. Need skilled trainers who can provide mentorship
 - d. Avg age of D.lab participant is 45+
 - i. People who want a turn in career
 - ii. People take the course, then bring family to take the course
 - e. Something that produces knowledge
 - f. Changing perspectives
 - g. Customized training for the clients
 - h. Increasing demand of trainers
 - i. Anecdote: Government body asked for training, MCISE customized for them and other organizations
 - j. Better marketing to structure the training better
 - k. President is able to step away to let the trainers start to take over
 - l. Work very hard for the recognition
 - m. Need to be able to track progress
 - n. Low cost at first because of a funder
 - o. Now that program is marketable, MCISE wants to optimize cost, business model
 - p. Need the trainers to go to high schools for the Tanara program
 - q. Problem: Very inconsistent training in Tanara
2. What lessons have you learned from running D.lab for the past several years?
 - a. Too broad a question
3. Where do you see D.lab going in the future? Where do you feel D.lab has room to improve?
 - a. Consistent programs
 - b. MCISE wants to launch a program similar to an MBA, but more practical/less academic
 - c. Very demanding program, also very difficult to scale

- d. Alternatively, create sub-programs
 - e. Networking/engagement; not just a website (website is just a tool), but a comprehensive strategy
 - f. Expand to more people
 - g. Better marketing
 - h. New types of programs
4. What do you want to get out of the online D.lab Platform? What aspects are most important to you?
- a. The platform is a means, not an end
 - b. Help solve MCISE's problems
 - c. Track their progress
 - d. AI that tracks, analyzes data
 - e. Create new ways to view content
 - f. Link to market, more outreach
 - g. Fully online learning not a priority or high-level need
 - h. Opportunity for impact
 - i. Convert data into insights
 - j. Make sure the tools are there to leverage the program
5. How do you validate when D.lab practice hours are completed?
- a. Send pictures of registration sheets
 - b. Aggregate the data
 - c. Audiofiles
 - d. Trainers get feedback from their trainees
6. What happens at the end of the training?
- a. Get testimonies from trainees
 - b. Track people and what trainings they go to
 - c. Social Media page for social entrepreneurship
 - d. Monitor or track the ideas that people go through
 - e. Help their lives
 - f. Capture emotions

7. Publicity of discussion forums and other resources?
 - a. Gamify to get people to come back and then bring in people
 - b. People have burnout, want to go offline
 - c. People may complete certain tasks and then unlock access to an event that may need a trainer
8. What do the practice hours entail? How do participants get their hours?
 - a. MCISE recommends opportunities to participants
 - b. Google forms to sign up
 - c. Trainers advertise themselves on LinkedIn, other social media
 - d. Make reporting easy for them
 - i. Get feedback on their performance
 - ii. Show their progress
 - e. Push people to do their own funding
 - f. Don't have the resources to give great feedback yet
9. Test Use the program
 - a. Give feedback on the platform
 - b. When do we want the feedback
 - c. Send the info to Mouslim
 - d. Align what he wants and what we have so we don't hear the same comment

The MCISE Expansion Team then asked questions, and the interview concluded.

APPENDIX G: LMS REMOVAL TABLE

This table shows the stage at which each LMS was removed from contention. “Stage 1” means that the platform did not have the necessary features to move forward in the selection process. “Stage 2” means that the platform did not have a high enough score compared to the other platforms to move forward. “Stage 3” means the platform was not selected by MCISE personnel to be the platform they wanted to use. Reasons were also given to supplement the reason for removal.

LMS	Removed in Stage	Reason for Removal
<i>Google Classroom</i>	1	Paywall
<i>Moodle</i>	N/A	N/A
<i>Canvas</i>	2	Lack of available information
<i>Blackboard</i>	1	Paywall
<i>Sakai</i>	1	Paywall
<i>D2L BS</i>	1	Paywall
<i>BNED LC</i>	1	Paywall, discussion forum, calendar
<i>eFront</i>	2	Low weighted total score
<i>Schoology</i>	1	Paywall
<i>Edmodo</i>	1	Paywall
<i>Skillsoft</i>	1	Paywall, space for session content, calendar, discussion forum
<i>Adobe Captivate</i>	1	Discussion forum
<i>Docebo</i>	1	Not fit for NGOs like MCISE
<i>Growth Engineering: The Academy</i>	2	Unreasonable cost; outlier among other possibilities
<i>Eliademy</i>	1	No longer supported
<i>OpenSIS</i>	1	Space for session content
<i>Chamilo</i>	2	Low weighted total score
<i>Litmos</i>	2	Low weighted total score
<i>Atutor</i>	2	Low weighted total score
<i>IMC Learning Suite</i>	2	Low weighted total score
<i>Digital Chalk</i>	2	Low weighted total score
<i>itsLearning</i>	2	Low weighted total score

LMS	Removed in Stage	Reason for Removal
<i>LonCapa</i>	1	Paywall
<i>OLAT</i>	1	Paywall
<i>iCohere</i>	1	Paywall
<i>LearnPress</i>	1	Calendar
<i>Tutor LMS</i>	3	MCISE decision
<i>Open edX</i>	3	MCISE decision
<i>Cornerstone Platform</i>	1	Paywall
<i>Podia</i>	1	Not appropriate for MCISE's business model
<i>Fresh Learn</i>	1	Discussion forum, calendar

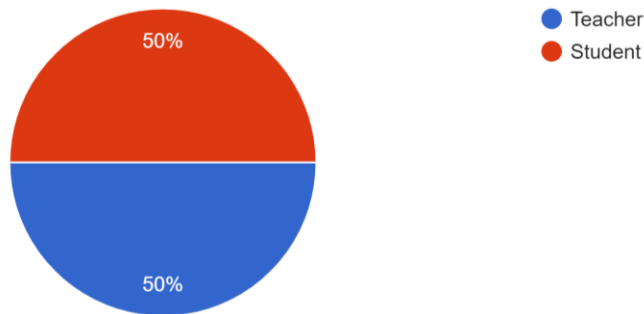
THIS SPACE
IS
INTENTIONALLY
LEFT
BLANK

APPENDIX H. HEURISTIC TEST RESPONSES

This appendix includes the responses to the heuristic evaluation. This study was conducted with 20 participants who had LMS experience, 10 of whom evaluated the platform from the teacher's perspective and 10 of whom evaluated the platform from the student's perspective. Participants were asked to rate the platform on a scale of 1 (catastrophic problem) to 5 (no problem) for each of Nielsen's Ten Usability Heuristics (1994), and they were given space at the end of the survey to enter any comments they had.

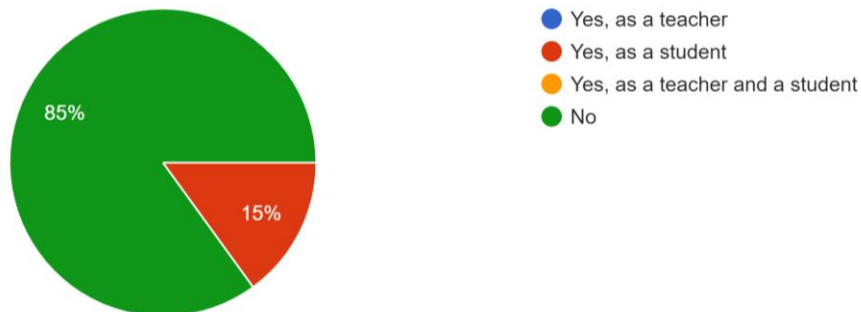
What role did you have while participating?

20 responses



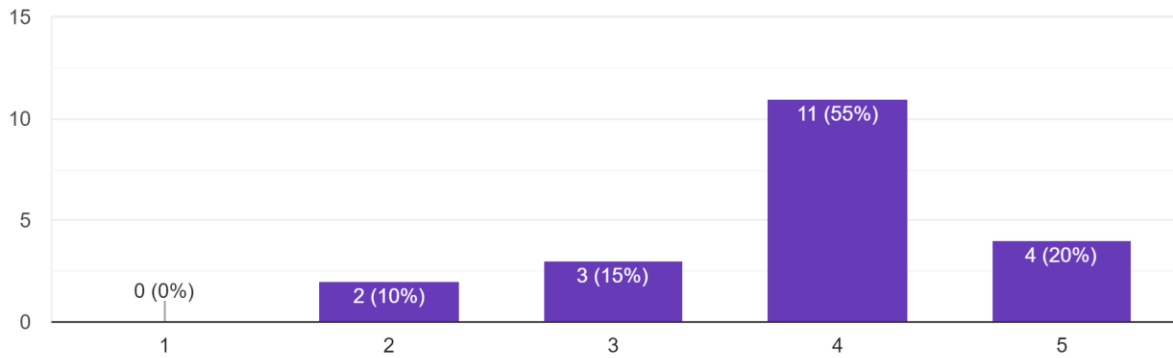
Have you used Moodle before?

20 responses



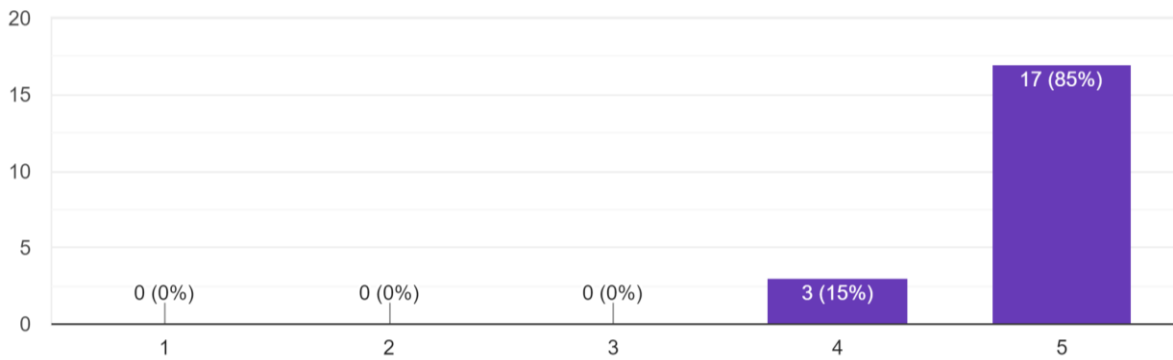
Visibility of System Status: Did you feel that you received adequate feedback from interactions/clicks? Are there visual cues that make you feel like you are on the right track?

20 responses



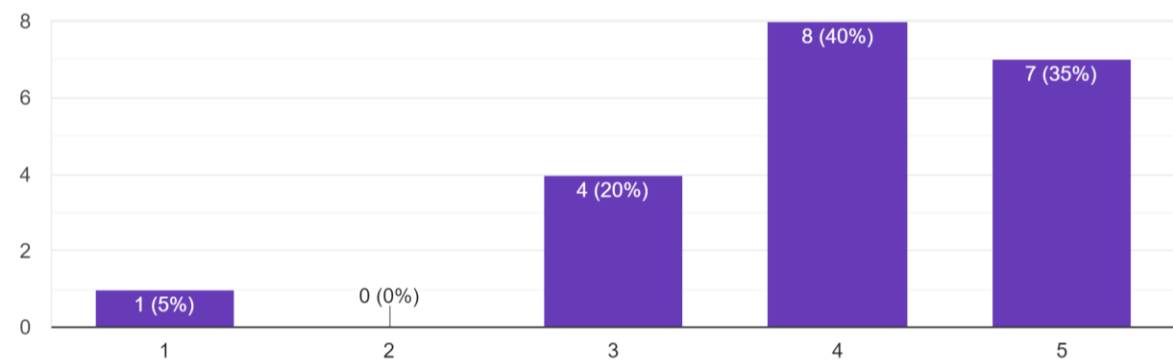
Match Between System and the Real World: Do you feel comfortable and familiar with the language on this platform? Did you have to look up any definitions?

20 responses



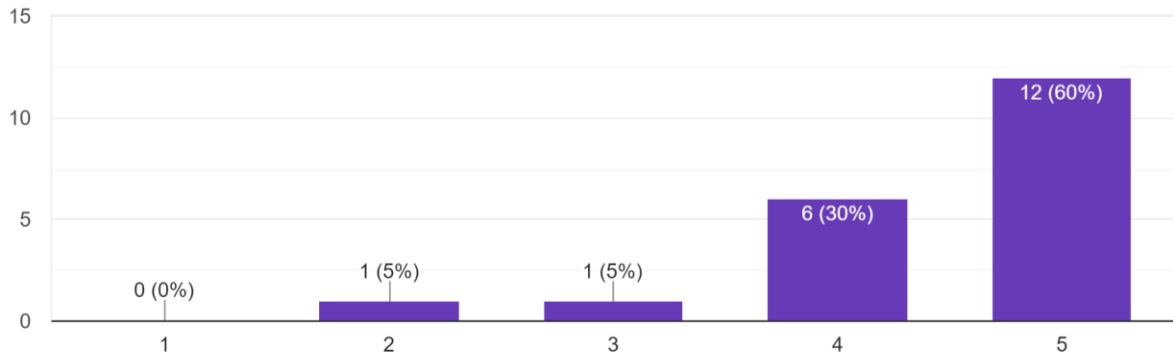
User Control and Freedom: Did you find it easy to go back if you clicked the wrong thing or made a mistake?

20 responses



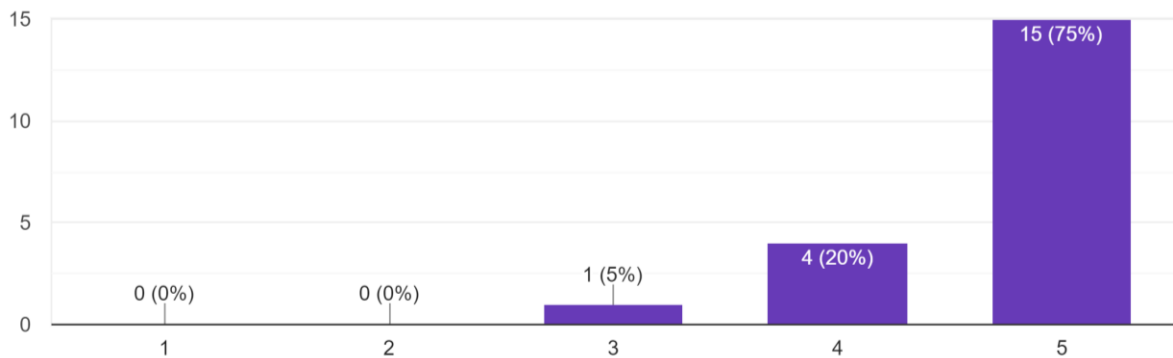
Consistency and Standards: Did you find this platform consistent in language and look?

20 responses



Error Prevention: Did you come across any errors?

20 responses

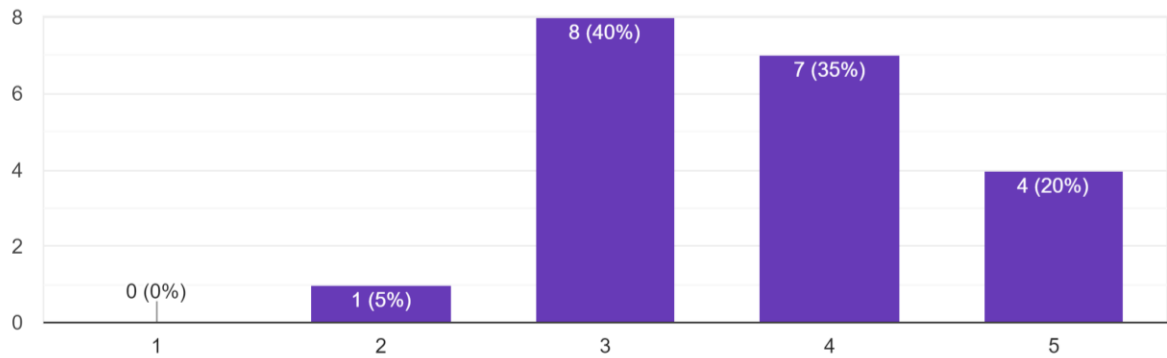


Please Explain Any Errors Faced

- “home page was confusing”
- “Did not show feedback on a graded assignment”
- “I think there's one step missing in the instructions for how to create a survey. Ya, of course it could be user error (as in all things with me).”
- “none”
- “there were little to no errors, just very confusing sections where i was unaware where to find things.”

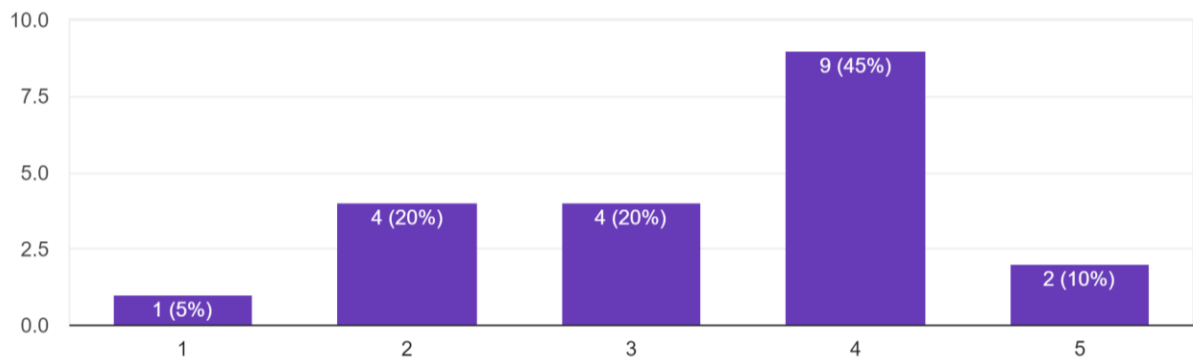
Recognition Rather Than Recall: Did you feel that you could recognize relevant information or you had to recall it from memory?

20 responses



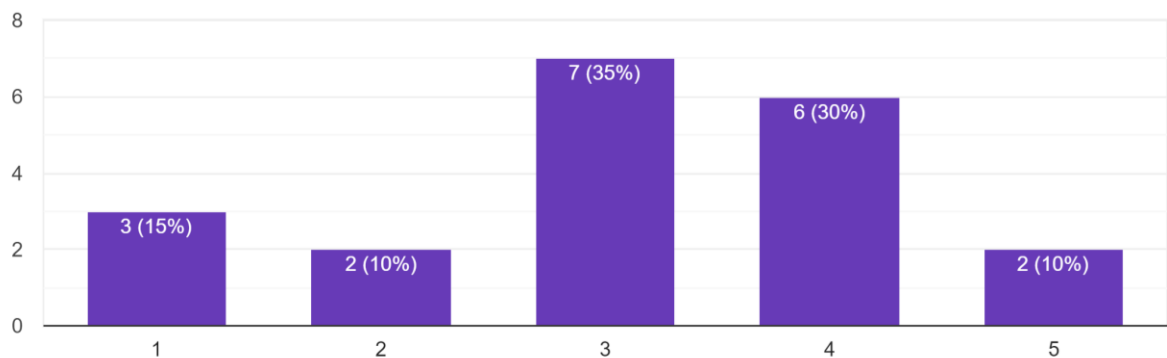
Flexibility and Efficiency of Use: How efficiently did you find this platform? Was it hard to navigate?

20 responses



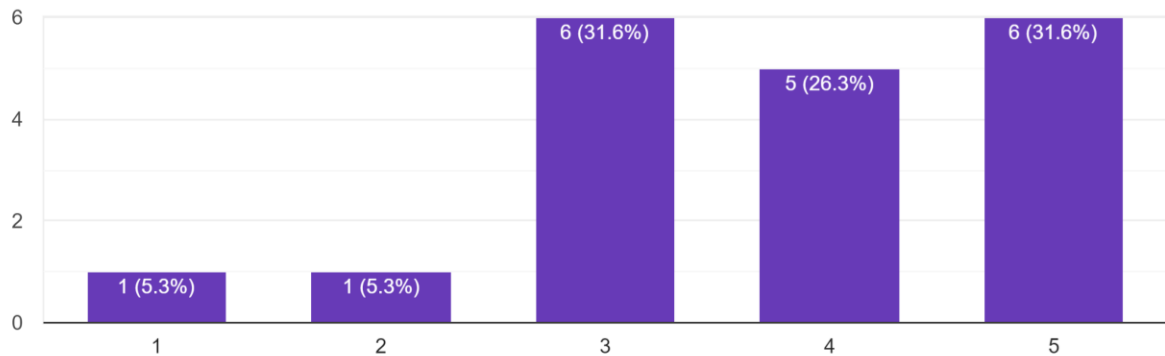
Aesthetic and Minimalist Design: Did you find the design of the platform engaging and aesthetically pleasing to look at?

20 responses



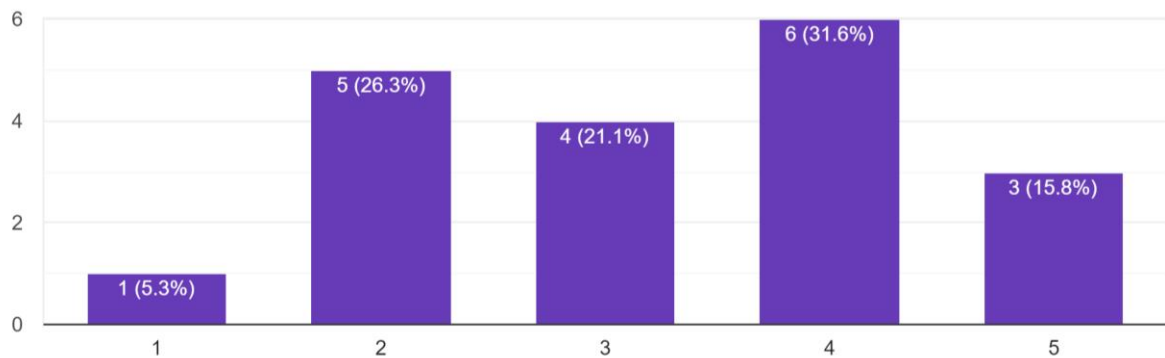
Help Users Recognize, Diagnose, and Recover from Errors: If you ran across an error, was it easily explained to you?

19 responses



Help and Documentation: If you had trouble completing a task, how easily were you able to find documentation or instruction to help?

19 responses



If you would like to explain your answers to any of these questions, please do so here.

- “the lab component was hard to find, and it was so far down the page and i feel like that's the most relevant part of the platform. also it was a lot of going back and forth between pages. also i don't like how you have to enable editing in order to make a survey, etc. it is also a lot of scrolling which is kind of annoying. website is also very very cluttered and not too appealing to look at.”
- “Help Users Recognize, Diagnose, and Recover from Errors: If you ran across an error, was it easily explained to you? I answered 3 to this question since it wasn't applicable, I didn't run into any errors.”

- “Color Scheme: I understand the orange color scheme because it's MCISE's colors, but often times the orange buttons fade into the background. Maybe use a darker orange? Or make the background picture more transparent? Or use a solid color background.
Background: Overall, the *Moodle* felt really busy and I think it's due in some part to the background. It was a bit difficult finding certain functions, but there was also probably a learning curve because I have never used *Moodle* before.
Grading a Student: I didn't know how to exit out of grading mode. I eventually clicked "Course: D-Lab" and it took me back, but I was very confused.
Editing Mode: Customize This Page vs. Turn Editing On? Not sure if you want consistent language between dashboard and course editing
Announcements, Discussions, Surveys: Is it possible to make these drop downs so you can close them? It's a lot to look at every single announcement, discussion, and survey all at once when you open up the course page. Might make it cleaner.
Important Links: I feel like "important" stuff should be further up the page or in a more easily accessible section.”
- “Not sure how much of this you can actually customize because you're building off of *Moodle*, but just some suggestions!”
- “starting out has overwhelming but got better as went”
- “The main layout was easy to use and user friendly and I think with more time and familiarity it would be very easy”
- “See my comment above about the survey. That's an easy fix for you all. The aesthetics works well on most pages. When I was creating an assignment things seemed to get a bit wonky and the aesthetics changed. It didn't make creating an assignment more difficult but it did make it a bit more difficult to read everything on the page.”
- “For the aesthetics portion, having rounded corners may make it look nicer, and having the private messaging section bound to the top of the page makes it feel like there is room to scroll up when there is none.”

- “Overall, the platform is easy to maneuver. Once you use the features, it becomes easy to complete tasks.”
- “it was hard to understand that I had to go into D Lab first. Also, taking the survey wasn't intuitive with the ‘not answered’ answer.”
- “the picture in the background of the platform made it hard to find buttons (hence to aesthetic)”
- “i didn’t find documentation i asked one of y’all and then i figured it out”
- “I think the site could be made more aesthetically pleasing, it felt as if I was just looking at the same text and I had to scroll up and down a few times to figure out where exactly the button I needed was. Maybe font size and font color differentiation, potentially even another font”
- “Some of the language in these survey questions is confusing”
- “I only struggled with turning the page to editing mode”
- “I could not find documentation on how to help me navigate tasks”

If you would like to express overall comments or concerns about the platform, please do so here.

- “see previous question”
- “It took me a minute to realize that I had to go into the D.lab course to access everything. The other thing was that some aspects (such as finding the MCISE webpage) were embedded deep in the platform, which would take some learning to get used to. Overall, I think the platform was well designed but there are aspects that could be made clearer/ put "to the forefront" (i.e. take less clicks to get there/ use less braincells to find)”
- “logo not going to mscise home page was confusing. does d lab need ot be inside mscise platform”
- “Y'all have done so much work here! Very cool!”

- “namely the grading buttons at the bottom of the page were difficult to see/find. also there are like 8 'add an activity' buttons for each activity but when you hit them they make you choose what you're adding, seems like you only need one that esp easy to find. i'd also recommend making buttons boxes or something so they stand out from the words (most are yellow but not all are), and i don't know what hitting the person in activities does but it changes?”
- “it was not my favorite experience in the world. it was hard to navigate, not intuitive and not that easy to look at”
- “much good am impressed”
- “There is very little indication on where to navigate from the homepage. At some points when several menus deep, it is very difficult to navigate backwards. The MCISE home page is not in a clear location, I would prefer to see it on the home page (not the course page). I would recommend a dedicated page to student/teacher lists, it was very hard to find a teacher profile to send a private message to them.”
- “this platform is very similar to canvas which was helpful as a user, however some things are titled oddly and i could not understand where to find some items. It was not implied that I should edit the page in order to add a survey or assignment.

APPENDIX I. USER GUIDE

Complete document follows.

**THIS SPACE
IS
INTENTIONALLY
LEFT
BLANK**



Moodle Basic User Guide

for MCISE's D.lab Platform

Written by Christopher DeMaio, Elisabeth Lynn, Vy Tran, and Hunter Wagner



Table of Contents

General Information	3
What is <i>Moodle</i> ?	3
<i>Moodle</i> Basic User Guide for MCISE's D.lab Program	3
Contacting Support	3
Getting Started	4
Registering an Account	4
Changing the Language	6
Navigating the Homepage	7
Administrator Guide	9
Setting Up a Course	9
Navigating the Site administration Block	11
Changing the Appearance of Your Site	12
Managing Blocks	14
Switching Roles	15
Restoring a Course	17
Backing Up a Course	20
Editing the Paywall	21
Teacher Guide	22
Creating a New Topic	22
Editing Topics	23
Making an Announcement	25
Grading an Assignment	26
Adding Events to the Calendar	27
Sending a Private Message	27
Responding to a Private Message	29
Course Enrollment	30
Enrolling in a Course (Students)	30
Enrolling in a Course (Teachers)	31

General Information

What is Moodle?

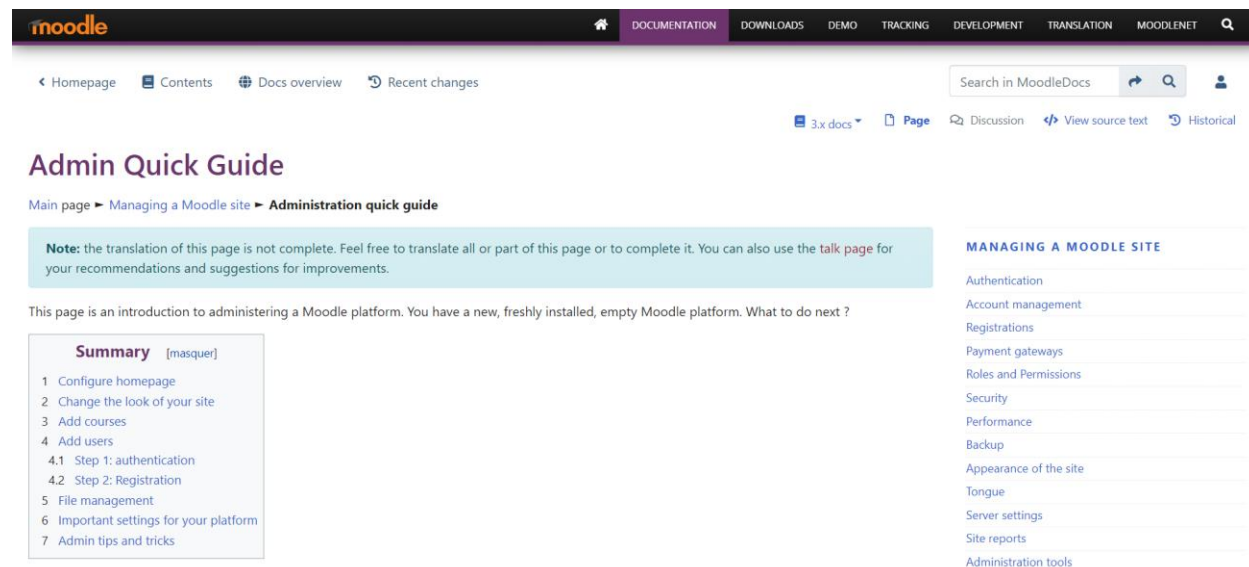
Moodle is an open-source learning management platform (LMS) used by institutions, educators, and students around the world for course creation and online learning.

Moodle has high appearance customizability and a large database of online support, including [Moodle user guides](#), [instructional videos](#), [online forums](#), and [email support](#).

Moodle Basic User Guide for MCISE's D.lab Program

This user guide assists users in navigating the *Moodle* site that was created for the MCISE D.lab program. The user guide includes help with basic features for teachers and administrators.

For a more detailed user guide, please visit the online user guide for [teachers](#) and [administrators](#). Below is a glimpse of the online user guide for administrators.



The screenshot shows the Moodle documentation website. The top navigation bar includes 'moodle', 'DOCUMENTATION', 'DOWNLOADS', 'DEMO', 'TRACKING', 'DEVELOPMENT', 'TRANSLATION', and 'MOODLENET'. Below the navigation bar, there are links for 'Homepage', 'Contents', 'Docs overview', and 'Recent changes'. A search bar is present with the text 'Search in MoodleDocs'. The main content area is titled 'Admin Quick Guide' and includes a breadcrumb trail: 'Main page > Managing a Moodle site > Administration quick guide'. A note states: 'Note: the translation of this page is not complete. Feel free to translate all or part of this page or to complete it. You can also use the talk page for your recommendations and suggestions for improvements.' Below the note, there is a paragraph: 'This page is an introduction to administering a Moodle platform. You have a new, freshly installed, empty Moodle platform. What to do next?'. A 'Summary' section lists the following items: 1. Configure homepage, 2. Change the look of your site, 3. Add courses, 4. Add users, 4.1 Step 1: authentication, 4.2 Step 2: Registration, 5. File management, 6. Important settings for your platform, 7. Admin tips and tricks. On the right side, there is a table of contents for 'MANAGING A MOODLE SITE' with links to: Authentication, Account management, Registrations, Payment gateways, Roles and Permissions, Security, Performance, Backup, Appearance of the site, Tongue, Server settings, Site reports, and Administration tools.

Contacting Support

To contact *Moodle* for further support, please visit the [online forums](#) or [email support](#) services.

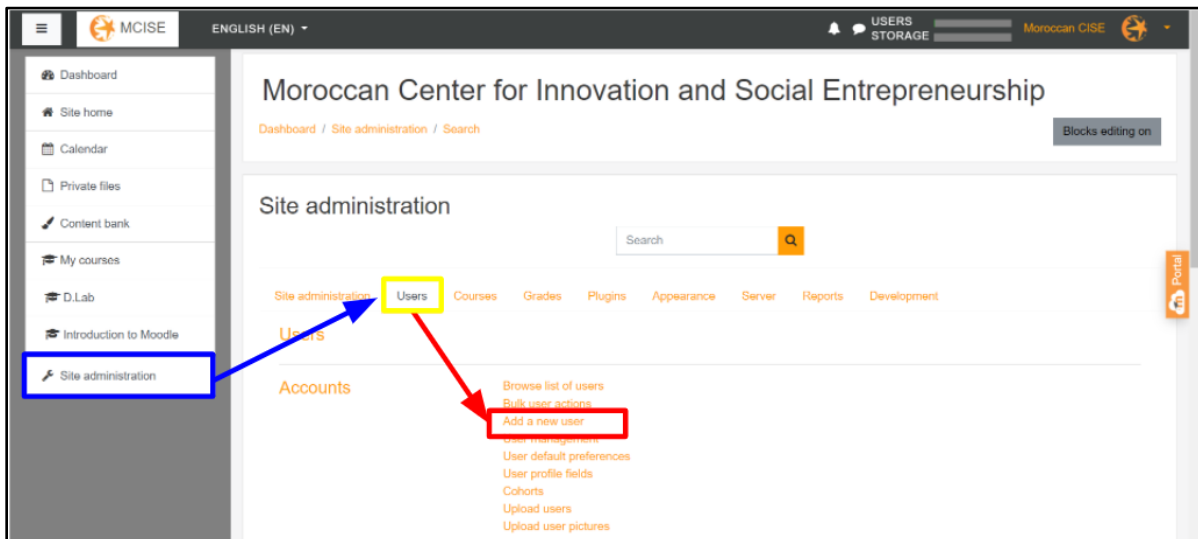
Getting Started

Registering an Account

Everyone who uses *Moodle* needs an account. Users can create an account themselves, or the administrator can manually create an account for the users. Note that users are not automatically assigned the role of teacher or student. (Click [here](#) for instructions regarding how to assign roles.)

To register users manually (as an administrator):

1. Click on **Site administration** (outlined in blue).
2. Click on **Users** (outlined in yellow).
3. Click on **Add a new user** (outlined in red).



4. Enter the required information, including the account name and password.

The screenshot shows the Moodle user creation interface. At the top, the page title is "Moroccan Center for Innovation and Social Entrepreneurship". Below the title is a breadcrumb trail: "Dashboard / Site administration / Users / Accounts / Add a new user". A "Blocks editing on" button is visible in the top right. The main content area is titled "General" and contains several form fields: "Username" (with a red underline), "Choose an authentication method" (set to "Manual accounts"), "New password" (with a red underline and a "Click to enter text" button), and "First name". There are also checkboxes for "Suspended account", "Generate password and notify user", and "Force password change". On the right side, there is an "Admin bookmarks" section with a "Bookmark this page" link and a "Portal" button.

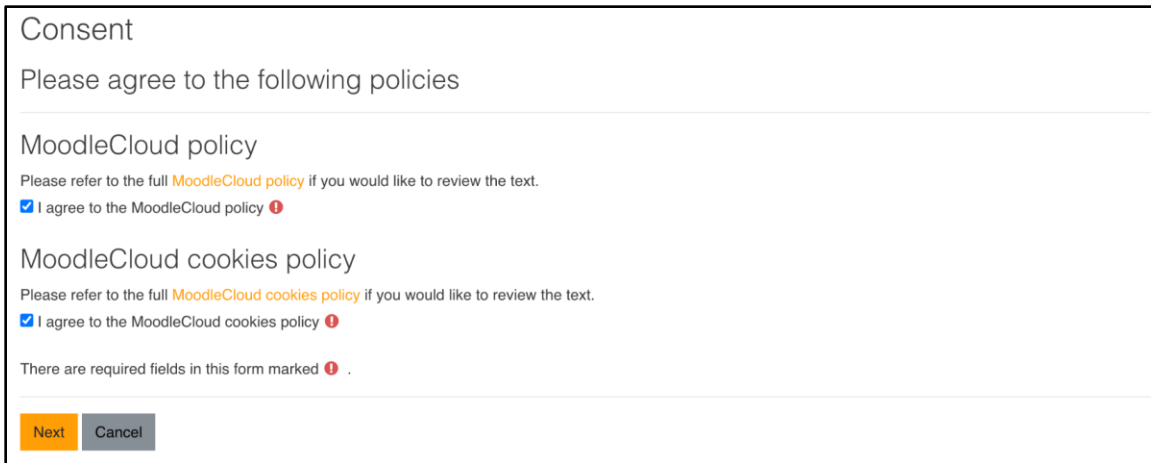
5. Click **Create user**.

To self-register as a new user:

1. Access mcise.moodlecloud.com.
2. Click **Create new account**.

The screenshot shows the Moodle login page. At the top, the page title is "Moroccan Center for Innovation and Social Entrepreneurship". Below the title is a login form with fields for "Username" and "Password", and a "Remember username" checkbox. A "Log in" button is located below the form. To the right of the form, there are links for "Forgotten your username or password?" and a note that "Cookies must be enabled in your browser". Below the login form, there is a section titled "Is this your first time here?" with a sub-header "For full access to this site you first need to create an account." and a "Create new account" button, which is highlighted with a red rectangle.

3. Click **Next** until *Moodle* takes you to the screen below.




Consent

Please agree to the following policies


MoodleCloud policy


Please refer to the full [MoodleCloud policy](#) if you would like to review the text.

I agree to the MoodleCloud policy 

MoodleCloud cookies policy

Please refer to the full [MoodleCloud cookies policy](#) if you would like to review the text.

I agree to the MoodleCloud cookies policy 

There are required fields in this form marked  .

Next Cancel

4. Check both of the boxes to agree to the terms and conditions.
5. Click **Next**.
6. Choose your account name, password, and email address.
7. Scroll down and click on **Create my new account**.
8. *Moodle* will take you to the site homepage.

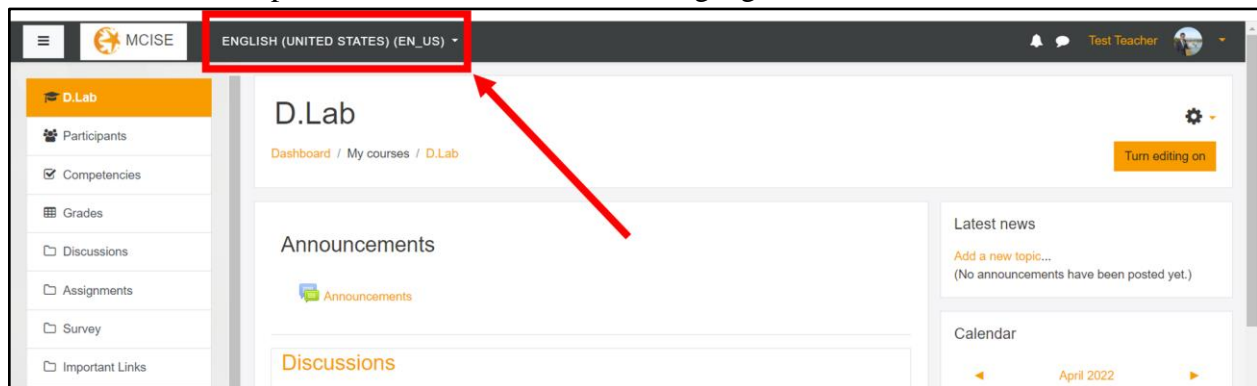
You're successfully registered as a user! If you're a student, learn to enroll in a course in the next section ([Enrolling in a Course \(Students\)](#)). If you're a teacher, enroll in a course by asking the administrator to assign you the teacher role for that course (See [Enrolling in a Course \(Teachers\)](#) or [this Moodle documentation](#) about assigning roles.)

Changing the Language

Moodle supports over 50 languages, including French and Arabic.

To change the language on the *Moodle* platform:

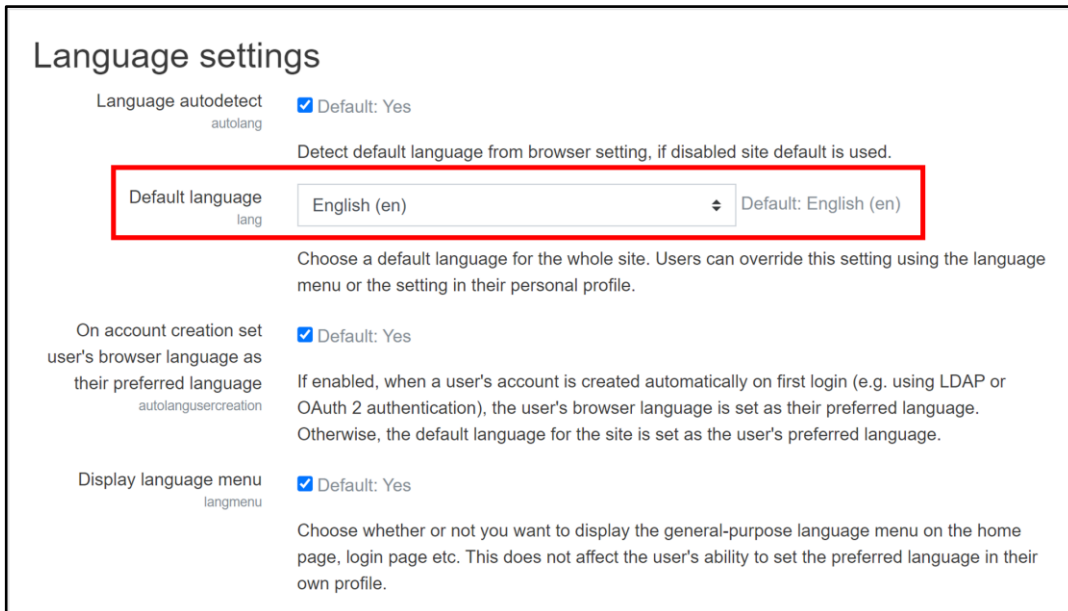
1. Click the dropdown that shows the current language.



2. Click on the desired language in the menu that opens.

To change the site-wide language default:

1. Click on **Site administration**.
2. Click on **Language settings**, under the **Site administration** tab.
3. Click on the **Default Language** drop down bar.



Language settings

Language autodetect Default: Yes
autolang

Detect default language from browser setting, if disabled site default is used.

Default language Default: English (en)
lang

Choose a default language for the whole site. Users can override this setting using the language menu or the setting in their personal profile.

On account creation set user's browser language as their preferred language Default: Yes
autolangusercreation

If enabled, when a user's account is created automatically on first login (e.g. using LDAP or OAuth 2 authentication), the user's browser language is set as their preferred language. Otherwise, the default language for the site is set as the user's preferred language.

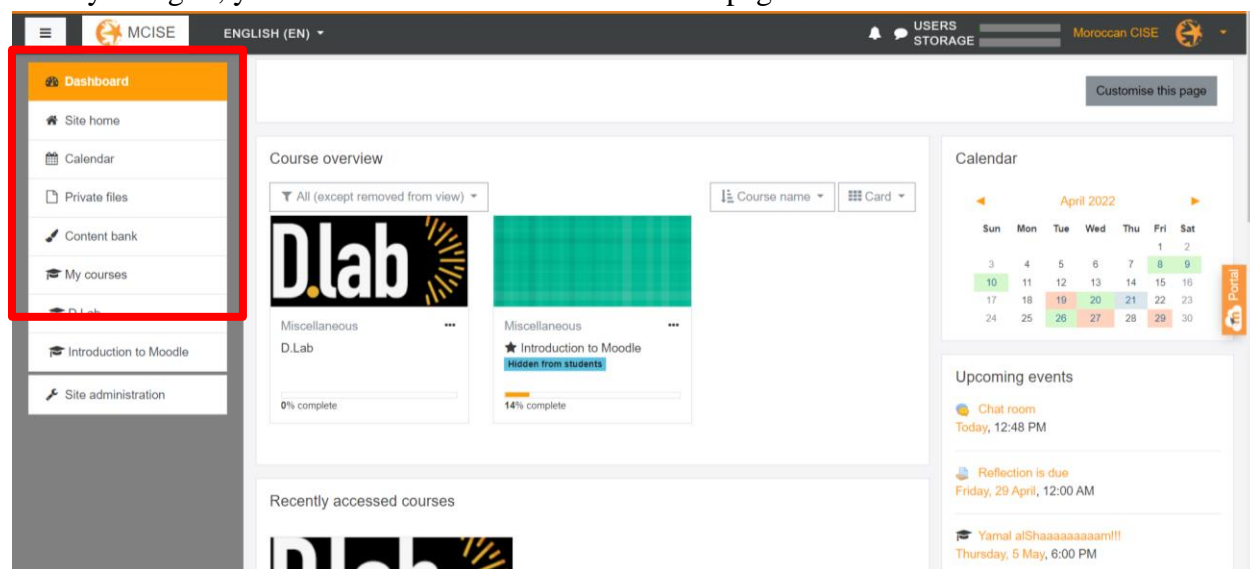
Display language menu Default: Yes
langmenu

Choose whether or not you want to display the general-purpose language menu on the home page, login page etc. This does not affect the user's ability to set the preferred language in their own profile.

4. Select your preferred default language.
5. Click **Save changes** at the bottom of the page.

Navigating the Homepage

After you log in, you will be taken to the *Moodle* Homepage.



The screenshot shows the Moodle homepage with a navigation sidebar on the left. The sidebar is highlighted with a red box and contains the following items: Dashboard, Site home, Calendar, Private files, Content bank, My courses, Introduction to Moodle, and Site administration. The main content area displays a course overview for 'Dlab' with a progress bar at 0% complete, and another course 'Introduction to Moodle' with a progress bar at 14% complete. There is also a calendar for April 2022 and a section for upcoming events.

On the left of the screen, you will see navigation links on the sidebar.

- Click **Dashboard** to see a general overview of all your courses and upcoming events on the calendar.
- Click **Site Home** to see the *Moodle* Homepage.
- Click **Calendar** to see the site-wide calendar.
- Click **Private files** to see a repository of files you have uploaded.
- Click **Content bank** to a *Moodle* area where content (currently [H5P](#) content) may be stored, edited, and created. (only available to administrators)
- Every registered course will appear under **My courses**. Click on a course to see that course's homepage.
 - Note: The **Introduction to Moodle** course takes the user to the Introduction to *Moodle* course. This course is not meant to permanently stay on the platform but was left here as a resource. It provides basic instructions on how to use *Moodle*.
- Click **Site administration** to access the site-wide settings page (only available to administrators).

THIS SPACE
IS
INTENTIONALLY
LEFT
BLANK

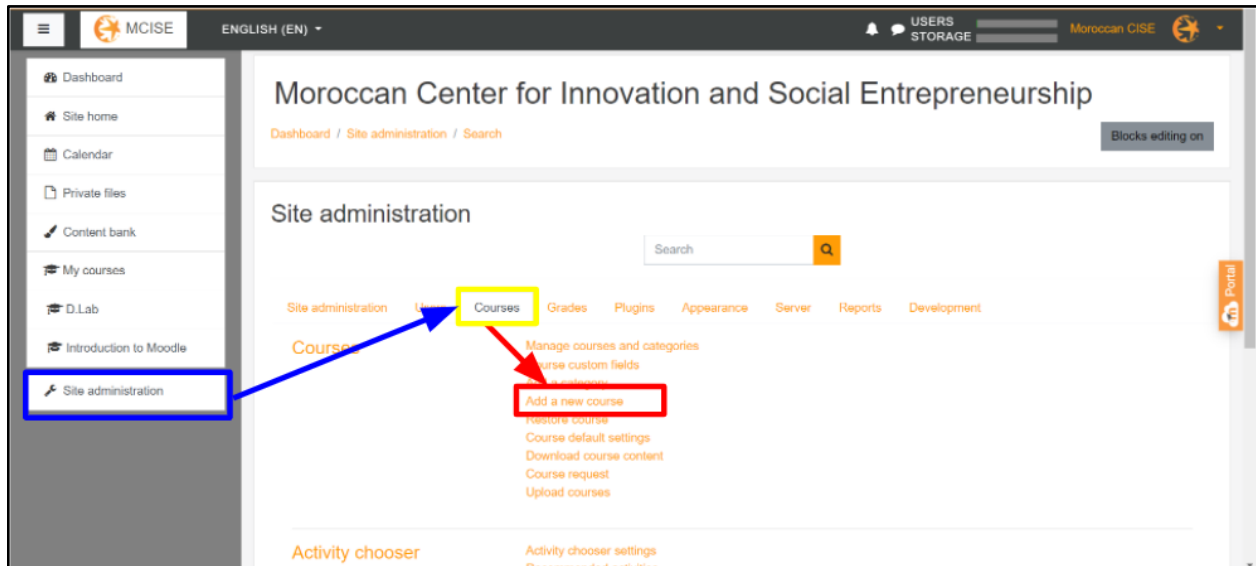
Administrator Guide

Setting Up a Course

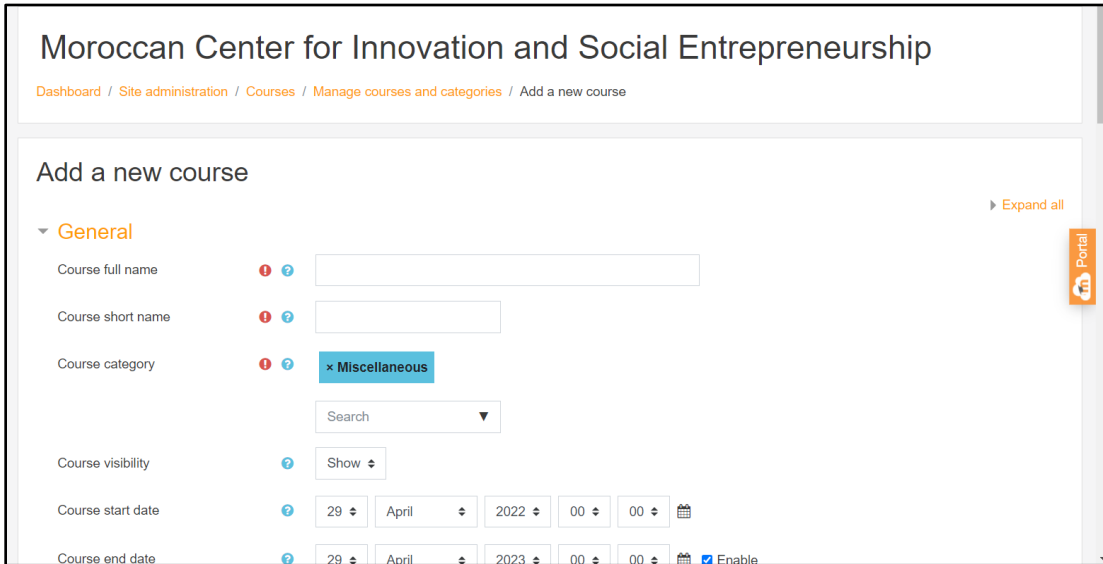
To add a new course to *Moodle*, you need to have the Administrator role. Refer to [this video](#) for a step-by-step walkthrough when setting up a course. We recommend that you create a teacher account to assign the teacher the course. While an administrator can also be a teacher, it is better to use a teacher account to differentiate responsibilities.

To add a new course:

1. Click **Site administration** (outlined in blue).
2. Click **Courses** (outlined in yellow).
3. Click **Add a new course** (outlined in red).



4. Moodle will take you to the screen below. Enter the course name, content, and start date.



The screenshot shows the Moodle interface for adding a new course. The page title is "Moroccan Center for Innovation and Social Entrepreneurship". The breadcrumb trail is "Dashboard / Site administration / Courses / Manage courses and categories / Add a new course". The main heading is "Add a new course" with an "Expand all" link. The "General" section is expanded, showing the following fields:

- Course full name: Text input field.
- Course short name: Text input field.
- Course category: A dropdown menu with "Miscellaneous" selected.
- Course visibility: A dropdown menu with "Show" selected.
- Course start date: A date picker set to 29 April 2022 00:00.
- Course end date: A date picker set to 29 April 2023 00:00, with an "Enable" checkbox checked.

5. **Optional:** Scroll down to the bottom of the page, and open the **Course Format** and **Appearance** dropdown menus to adjust additional settings.

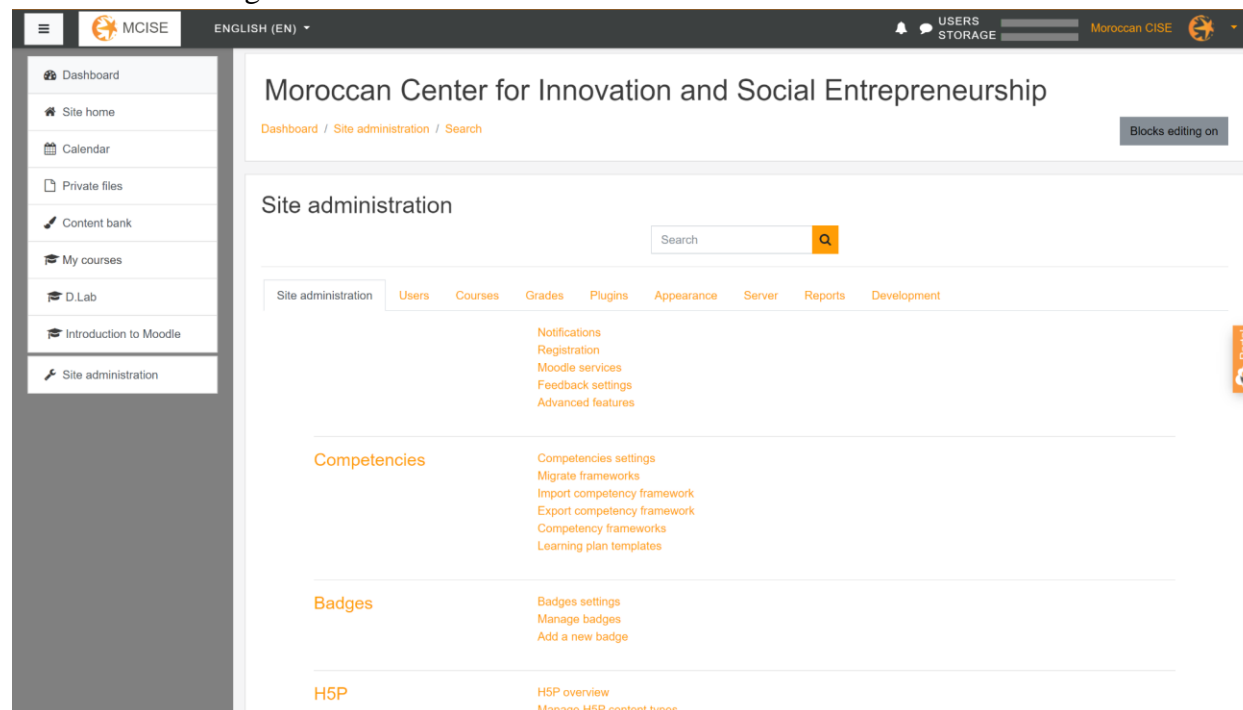
6. Select **Save and display**.



The screenshot shows the Moodle course settings form. The "Show activity reports" and "Show activity dates" options are both set to "Yes". Below these are several expandable sections: "Files and uploads", "Completion tracking", "Groups", "Role renaming", and "Tags". At the bottom of the form, the "Save and display" button is highlighted with a red box, and the "Cancel" button is visible next to it. A message at the bottom of the form states "There are required fields in this form marked [red dot icon]".

Navigating the Site administration Block

The site administration page allows the administrator to change most things about the *Moodle* site. From here, the administrator will see nine different tabs. Each tab can control different aspects of the site. The **Site administration** block controls most of the settings that cannot fit into one of the other eight tabs.



- The **Site administration** tab allows you to control basic *Moodle* settings such as notifications and feedback. You can also edit competencies, badges, language settings, and the mobile app using this feature.
- The **Users** tab allows you to control all aspects of the site's users. The administrator can remove users, add users, define roles, and access data about the users.
- The **Courses** tab allows you to add new courses, delete courses, back up courses, restore courses, and adjust some course settings.
- The **Grades** tab can control how grades are given site-wide. It also functions as a database for all grades given to students throughout all courses.
- The **Plugins** tab allows you to add, manage, and remove the plugins installed on the site.
- The **Appearance** tab allows you to control how the whole site looks. To do basic tasks, such as changing background colors or font, visit [To change the Appearance of your site](#) section.
- The **Server** tab allows you to manage how the *Moodle* site interacts with the server. Here, the administrator can change email settings and the scripts the site uses.
- The **Reports** tab allows the administrator to check the logs of the site. The logs track user inputs and sign-in data. They also allow the administrator to see when and what each user

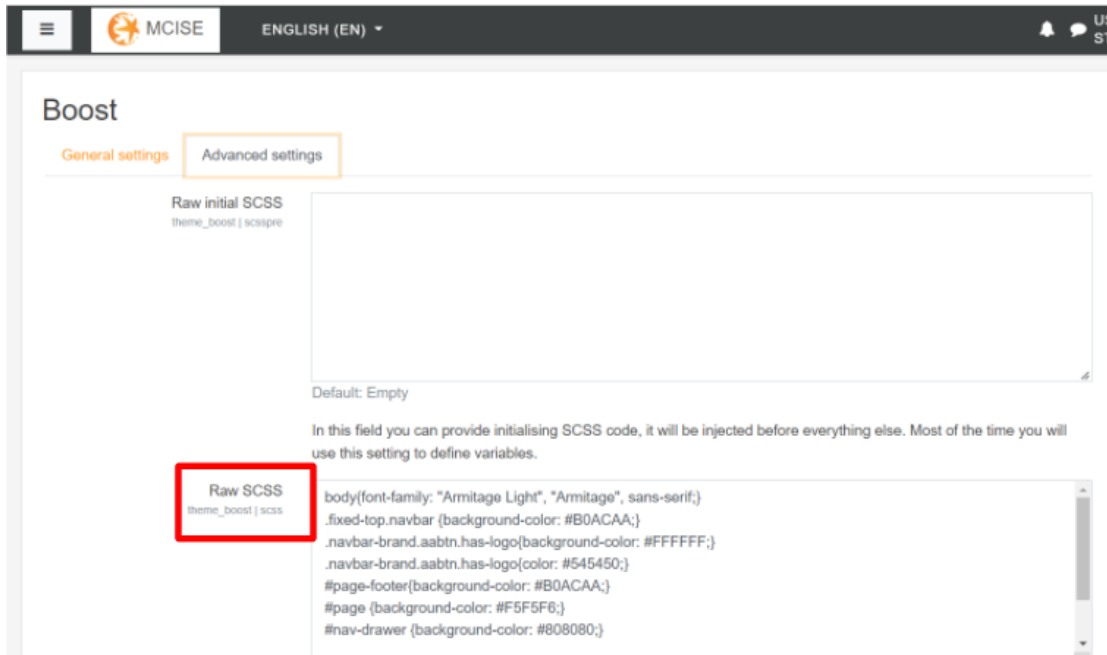
is doing at any time. This can be used to debug the platform or track any suspicious activity.

- The **Development** tab allows the administrator to try experimental features that *Moodle* has developed but that are not guaranteed to work. It also allows the administrator to debug the site.

Changing the Appearance of Your Site

To change the basic appearance of your site, such as background colors:

1. Click on **Site administration**.
2. Click on **Appearance**.
3. Click on **Theme**.
4. Click on **Boost**.
5. Make the desired edits to the site's theme.
 - The **General Settings** tab allows you to change the brand color, download a theme, and add a background image.
 - The **Advanced Settings** tab allows you to make additional changes by inputting CSS code.
Refer to [W3Schools's CSS Tutorial](#) for instructions on how to write CSS code.
6. After making edits, click **Save Changes** and refresh the page. It may take a few moments before edits appear.

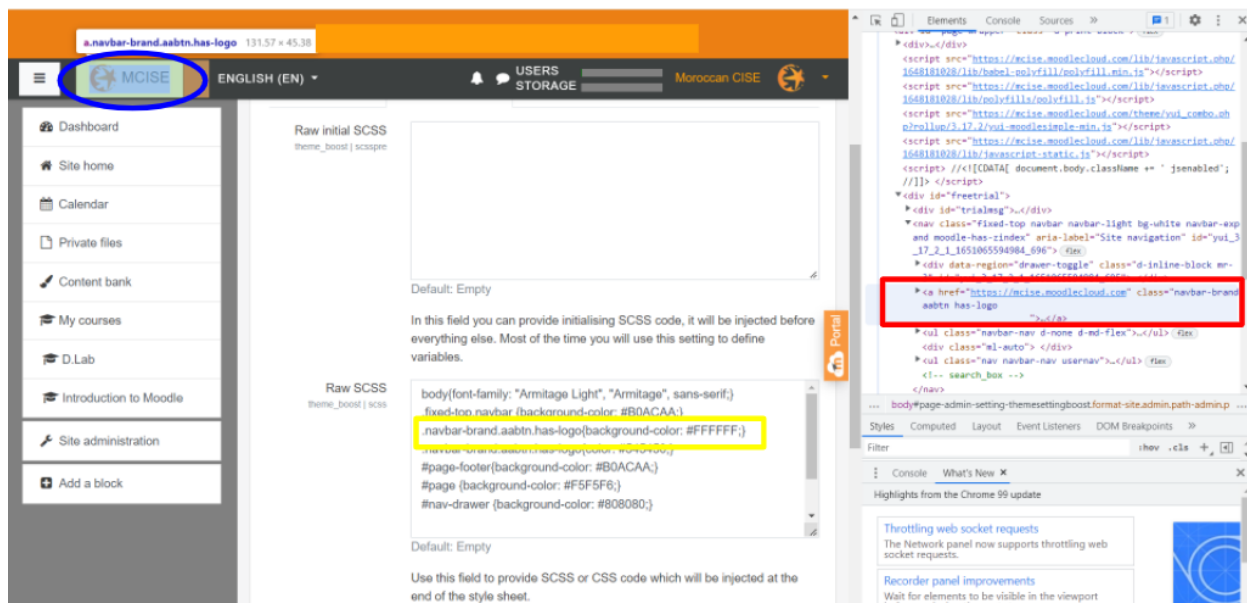


Tips for identifying CSS elements to change:

- The F12 key allows you to look at the HTML code for the website.
- Hovering the mouse over different sections of the code will highlight the respective areas of the page that are governed by that code.

For example, when hovering the mouse over the section of code in the red box, the section of the website in the blue oval is highlighted, indicating that this is the area of the webpage that the code is referring to. You can now identify the element you want to change, as well as its class and id.

To change the background color of this section to white, the line of code in the yellow box was written. As mentioned above, refer to [W3Schools's CSS Tutorial](#) for instructions on how to write CSS code.

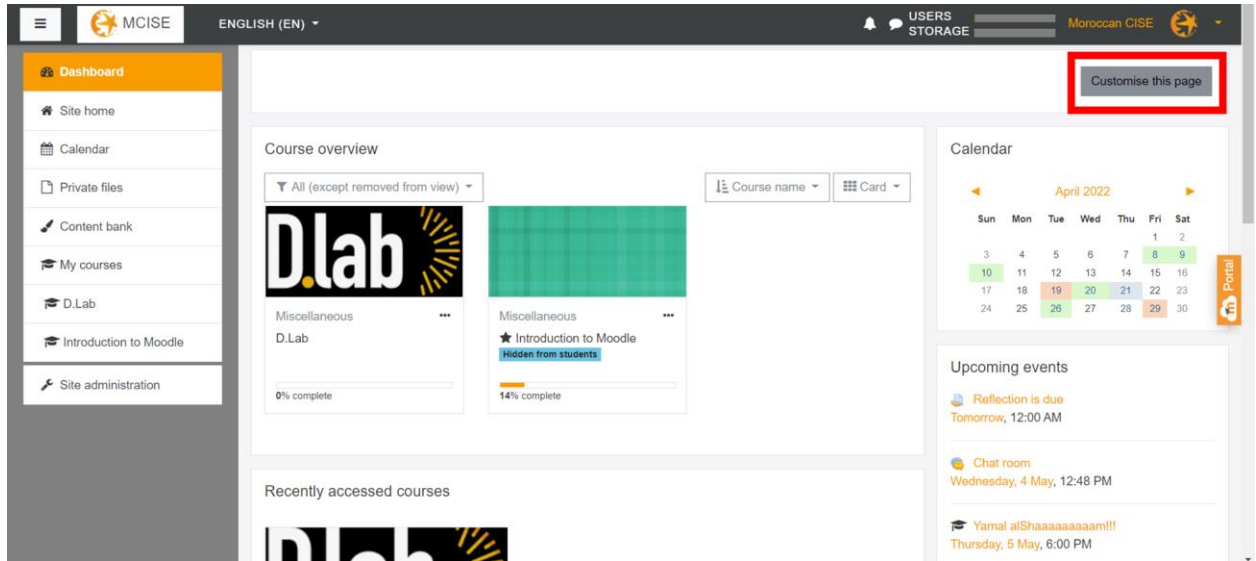


Managing Blocks

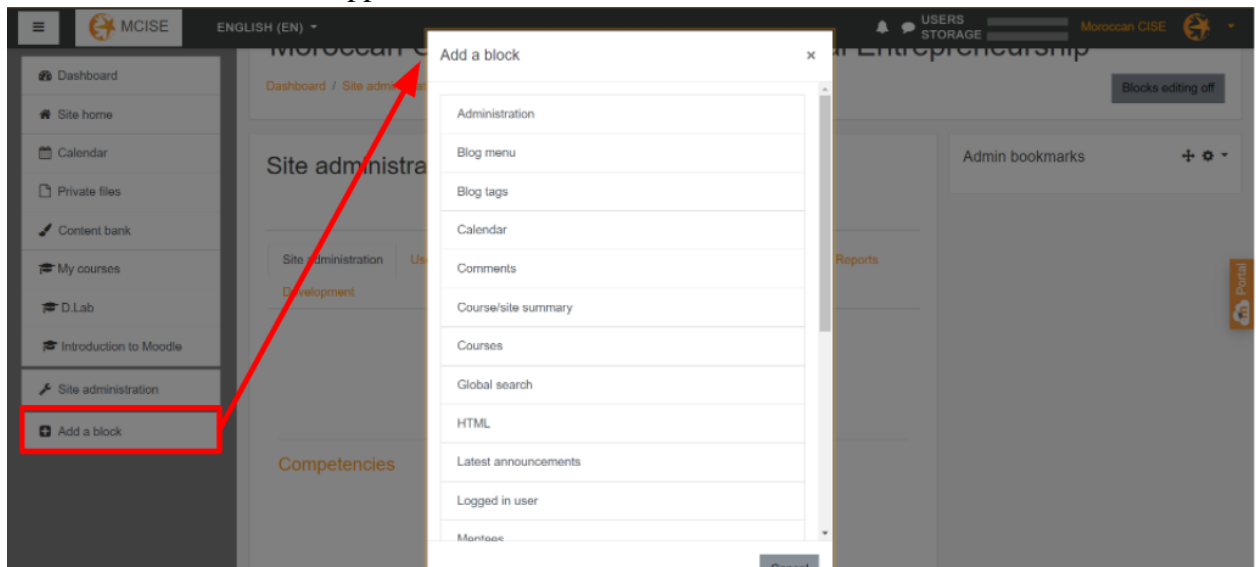
You must be logged in as an administrator to add a block.

To add a block:

1. Click **Customise this page**.



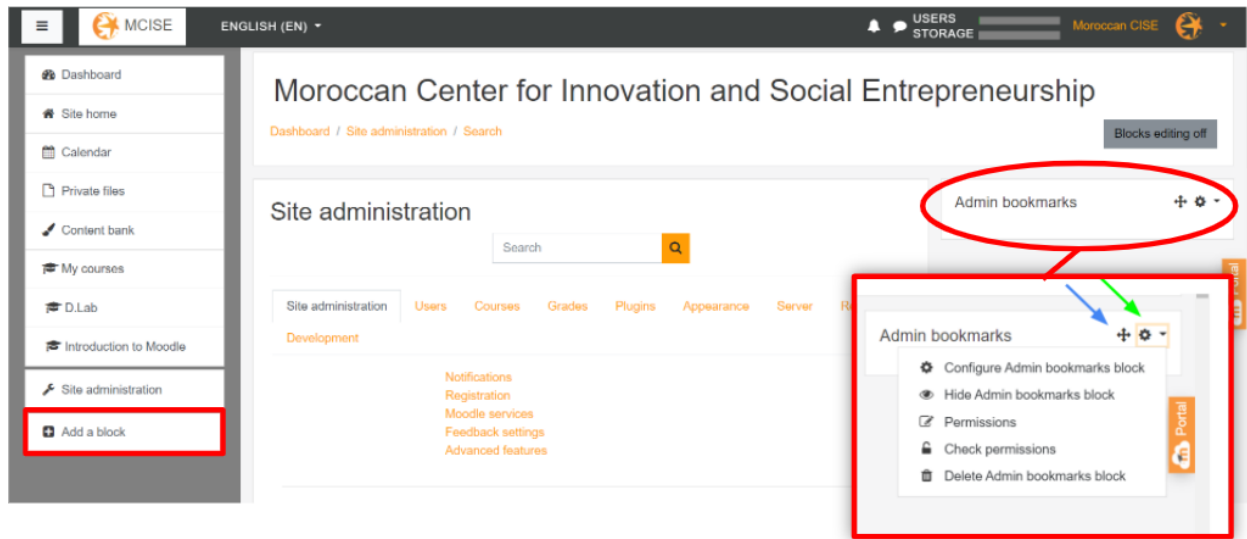
2. Click **Add a Block**
3. Select the type of block you would like to add (for example, **Dashboard** or **Calendar**).
The block should appear on the screen.



To edit a block:

1. Click on the settings icon (green arrow).
2. Select the option that corresponds with what you would like to change.
3. Edit the block's settings as you deem necessary.
4. Confirm your changes.

Note: Click on the icon to the left of the settings icon (blue arrow), to manually move the block.

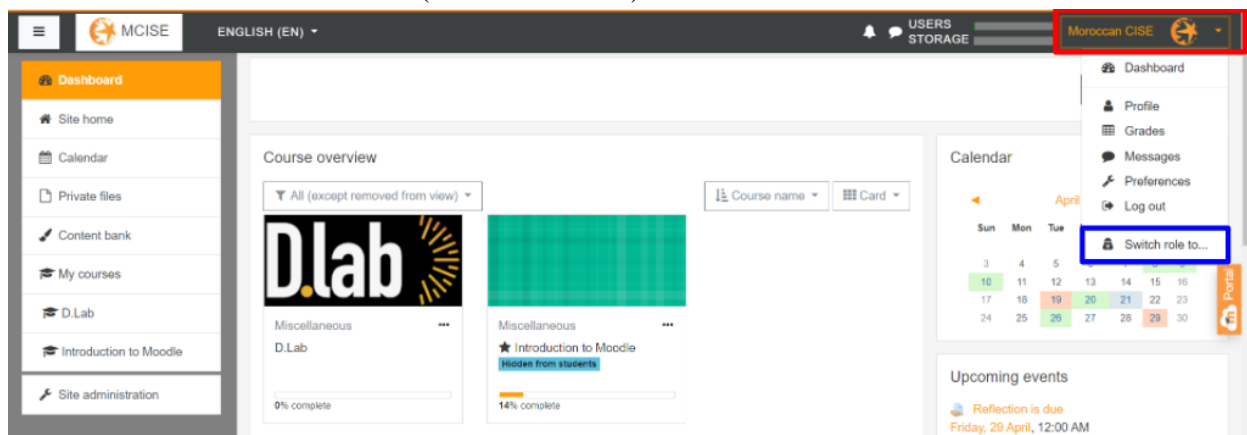


Switching Roles

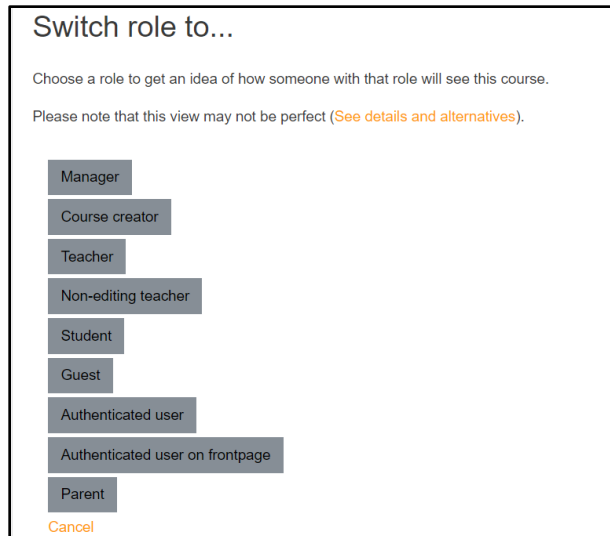
You can use the “Switch role to...” feature to view the site as any of various types of users.

To switch your role:

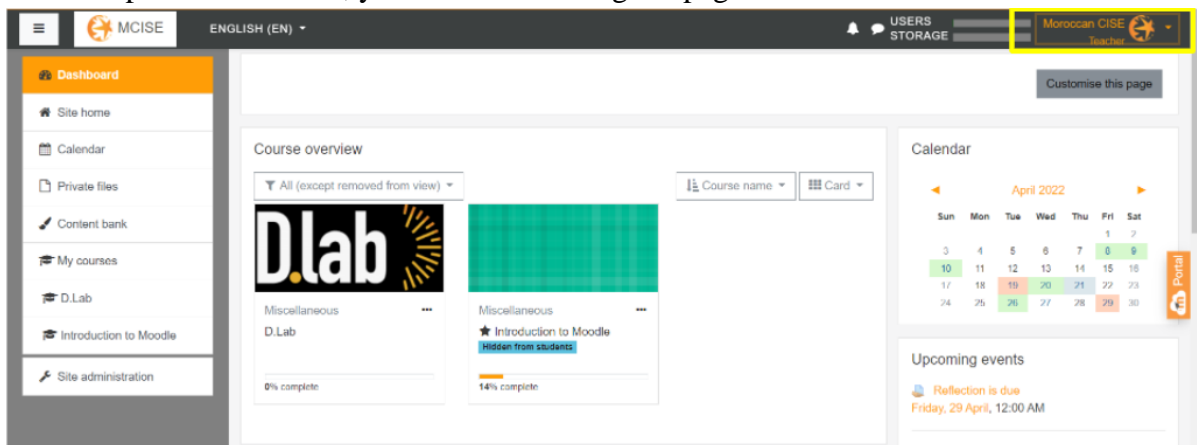
1. Click the dropdown of the administrator profile at the top right of the screen (outlined in red).
2. Click **Switch Role to...** (outlined in blue).



3. Click the role you would like to view the page as.

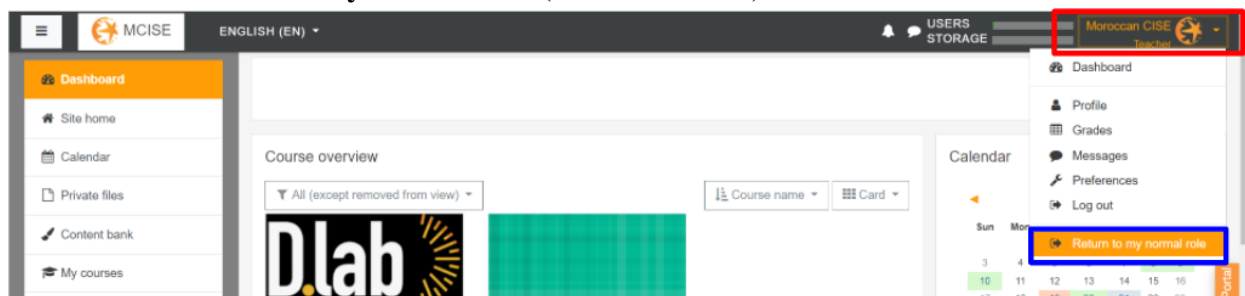


Now, the profile at the top right of the screen will show which role you are viewing the page as. In the example shown below, you are now viewing the page as a teacher.



To return to viewing the page as an administrator again:

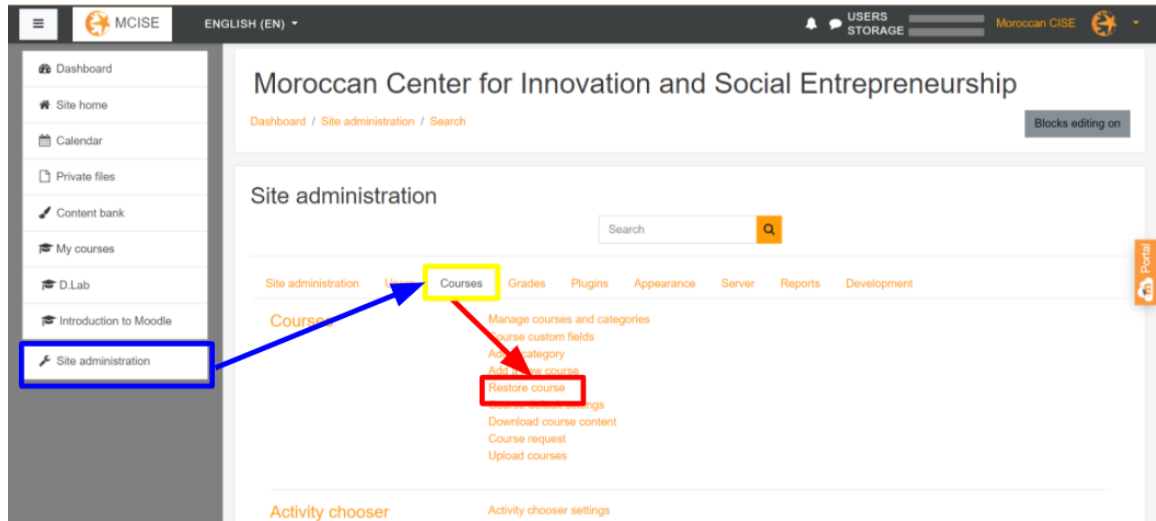
1. Click the drop down in the top-right of the screen (outlined in red).
2. Click **Return to my normal role** (outlined in blue).



Restoring a Course

To restore the course to a previous version:

1. Click **Site administration** on the left side of the screen (outlined in blue).
2. Click the **Courses** tab (outlined in yellow).
3. Click **Restore course** (outlined in red).



4. Click **Choose a file**.
5. Click **Choose file**.
6. Find the backup file in your directory.
7. Click **Upload this file**.
8. Click **Restore**.



9. Scroll to the bottom of the screen and click **Continue**.

You must decide whether to create a new course from the backup file, merge the backup file into an existing course, or replace an existing course with the backed-up course.

To create a new course from the backup file:

1. Select a course category from the available options (red outline).
2. Click **Continue** (blue outline).

Restore as a new course

Restore as a new course

Select a category

Name	Description
Miscellaneous	

Search categories

3. Ensure the settings shown are correct.
4. Click **Next**.
5. Enter the prompted information about the course.
6. Ensure the settings shown are correct.
7. Click **Next**.
8. Click **Perform restore**.
9. Click **Continue**.

You should now be taken to the restored course.

To merge the backup file into an existing course:

1. Ensure the **Merge the backup course into the existing course** option is selected (red outline).
2. Select the course into which you would like to merge the backed-up course (blue outline).
3. Click **Continue** (yellow outline).

Restore into an existing course

Merge the backup course into the existing course

Delete the contents of the existing course and then restore

Select a course

Course short name	Course full name
THIS IS A TEST COURSE 3	THIS IS A TEST COURSE 3
MCISE	Moroccan Center for Innovation and Social Entrepreneurship
D.Lab	D.Lab
Introduction to Moodle	Introduction to Moodle

Search courses

4. Ensure the settings shown are correct.
5. Click **Next**.
6. Ensure the settings shown are correct.

7. Click **Next**.
8. Click **Perform restore**.
9. Click **Continue**.

You should now be taken to the restored course.

To replace an existing course with a backed-up course:

1. Ensure the **Delete the contents of an existing course** option is selected (red outline).
2. Select the course you would like to replace (blue outline).
3. Click **Continue** (yellow outline).

Restore into an existing course

Merge the backup course into the existing course

Delete the contents of the existing course and then restore

Select a course

Course short name	Course full name
<input type="radio"/> THIS IS A TEST COURSE 3	THIS IS A TEST COURSE 3
<input type="radio"/> MCISE	Moroccan Center for Innovation and Social Entrepreneurship
<input checked="" type="radio"/> D.Lab	D.Lab
<input type="radio"/> Introduction to Moodle	Introduction to Moodle

Search courses

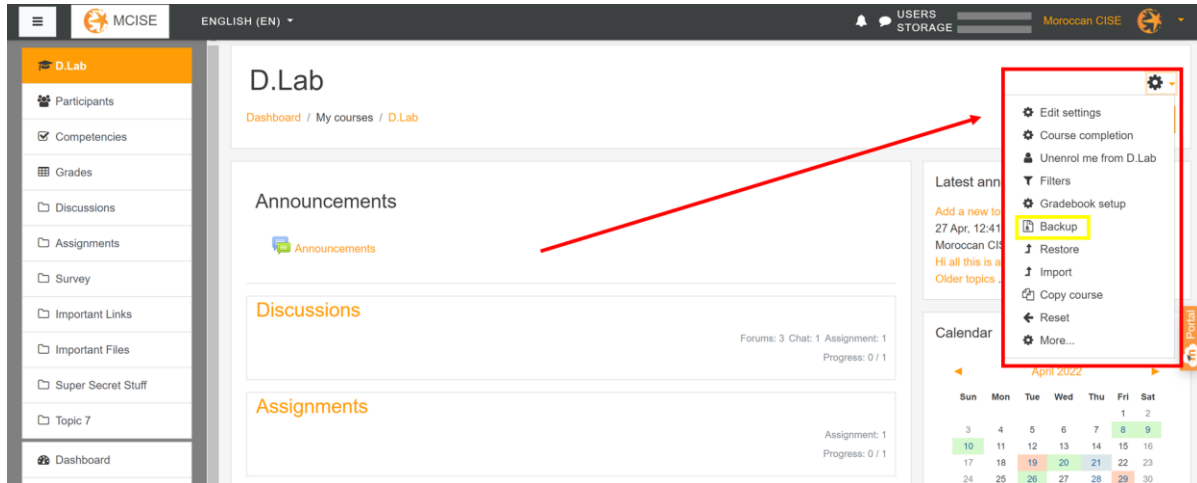
4. Ensure the settings shown are correct.
5. Click **Next**.
6. Ensure the settings shown are correct.
7. Click **Next**.
8. Click **Perform restore**.
9. Click **Continue**.

You should now be taken to the restored course.

Backing Up a Course

To back up the course:

1. Navigate to the course you want to back up.
2. Click on the cog in the top right corner of the screen.
3. Click **Backup**.



4. Ensure the settings shown are correct.
5. Click **Next**.
6. Ensure the settings shown are correct.
7. Click **Next**.
8. Click **Perform Backup**, and wait for the backup to complete.
9. Click **Continue**.

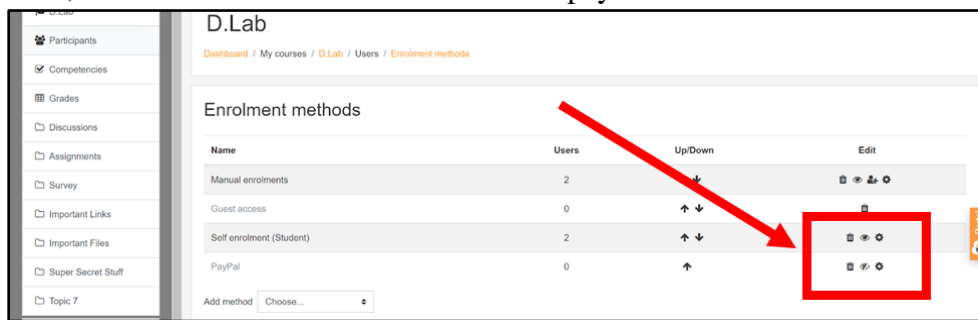
You will then see the new backup file you created. You can download that backup file and use it later to restore the course.

Editing the Paywall

To turn the paywall on and off:

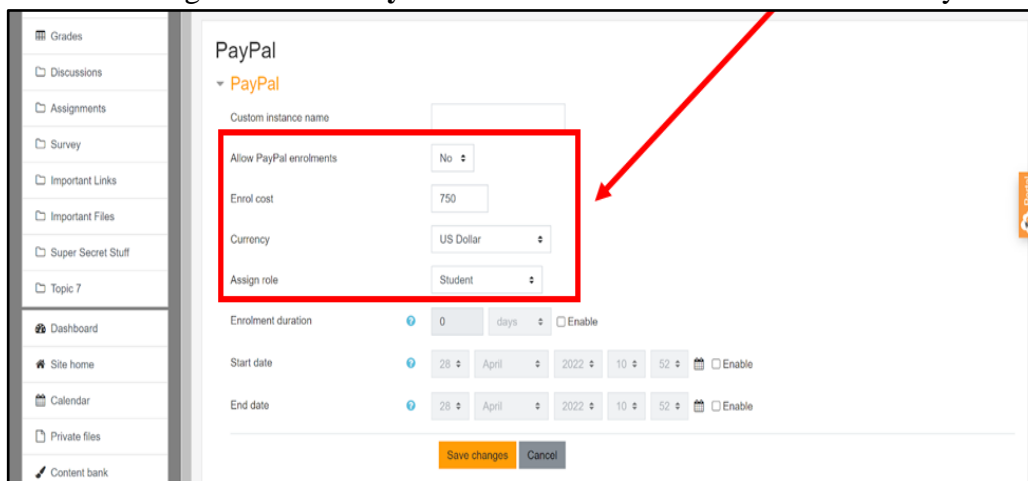
1. Navigate to the class you want to edit the paywall on.
2. Click **Participants**.
3. Click on the cog.
4. Click **Enrolment methods**.
5. Click on the eyeball icon for **PayPal** to change the paywall's visibility.
6. Click on the eyeball icon for **Self enrolment** to change the availability of student self-enrollment.

IMPORTANT: Only one of **Self enrolment** and **PayPal** should be visible at the same time. If both are visible, students can self-enroll and avoid the paywall.



To change the paywall price and other settings:

1. Navigate to the class for which you want to edit the paywall.
2. Click **Participants**.
3. Click on the cog.
4. Click **Enrolment methods**.
5. Click on the cog next to the **PayPal**. You will be taken to a screen with PayPal settings.



6. Adjust the settings to match your preferred options.
7. Click **Save changes**.

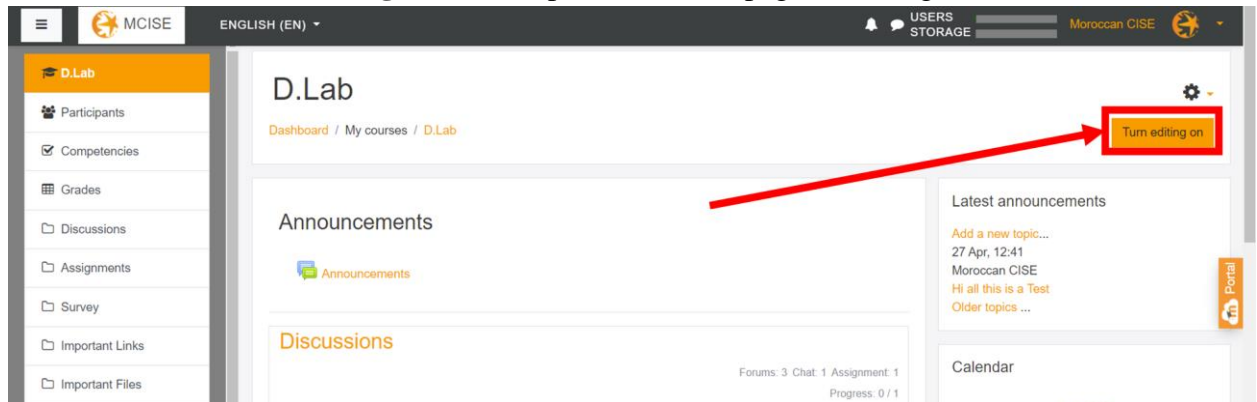
Teacher Guide

Creating a New Topic

Creating a new topic is how the teacher can add new sections to the course. You must begin on the course homepage to add a new topic for the course or edit topics for the course.

To add a new topic:

1. Click on **Turn editing on** at the top of the course page on the right-hand side.



2. Scroll down to the bottom of the page and click **Add topics**.
3. Choose the number of new topics you want to create.
4. Click **Add topics**.

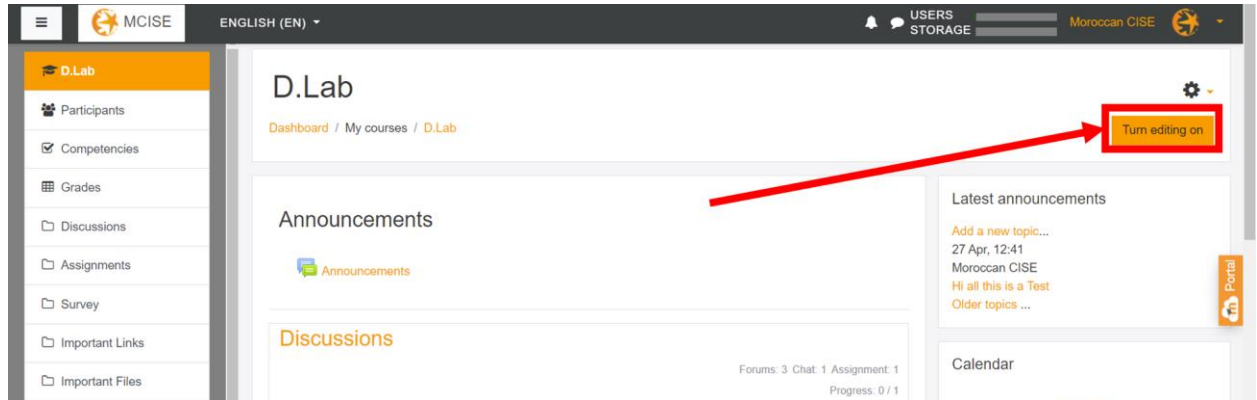
A screenshot of the 'Add topics' dialog box. The dialog has a title bar 'Add topics' with a close button (X). Below the title bar is a label 'Number of sections' followed by a dropdown menu showing the number '1'. At the bottom of the dialog are two buttons: 'Add topics' (orange) and 'Cancel' (grey).

Editing Topics

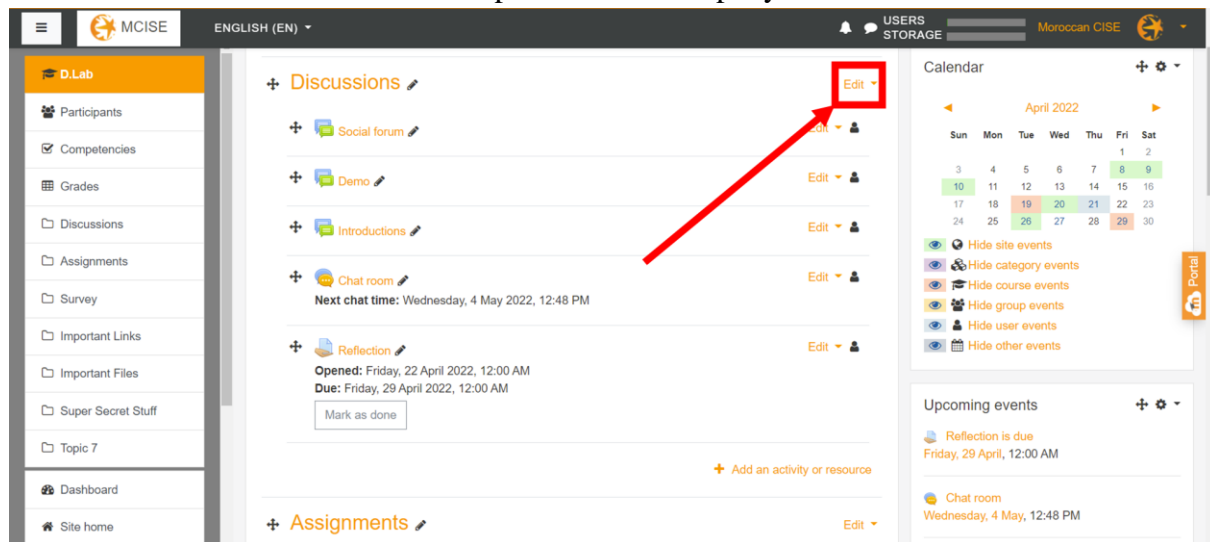
You must begin on the course homepage to populate or edit course topics.

To change the name or description of the topic:

1. Click **Turn editing on** at the top of the course page on the right-hand side.



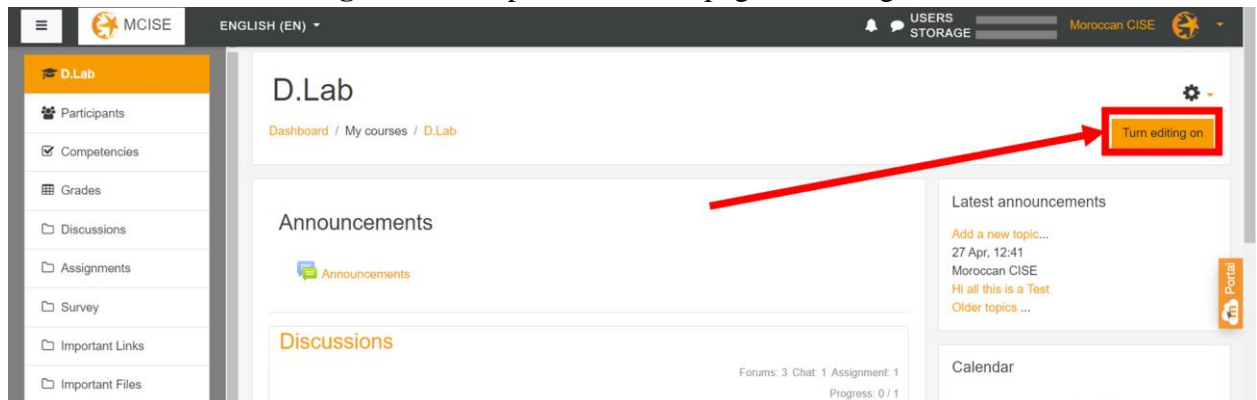
2. Click the **Edit** button that corresponds with the topic you would like to edit.



3. Click **Edit topic** in the drop-down that appears.
4. Edit the settings.
5. Click **Save changes**.

To add activities or resources to the Topic:

1. Click **Turn editing on** at the top of the course page on the right-hand side.

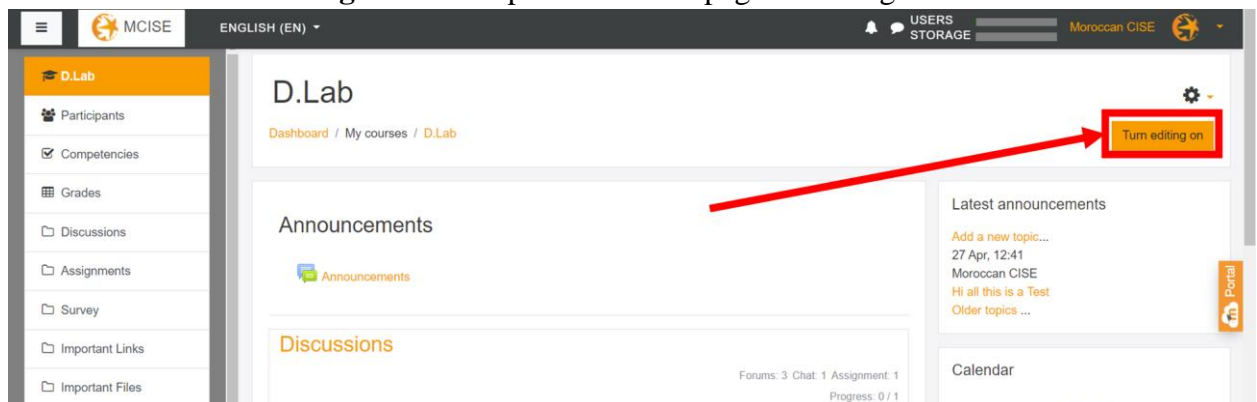


2. Click **Add an activity or resource** on the topic you want to add a new activity or resource to. You will see a pop-up with a list of all the possible activities and resources you can add.
3. Choose the activity or resource that fits your needs. You will then be taken to a new screen where you can edit all the information about the new activity.
4. When you are finished configuring the activity or resource, click **Save and display** or **Save and return to course**.

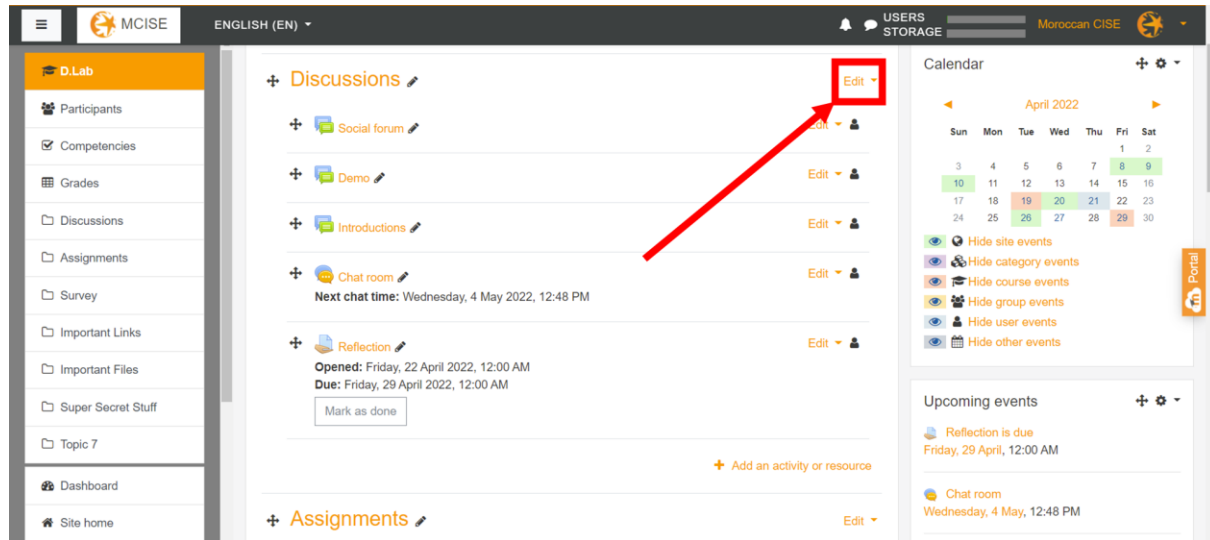
For more information, refer to [this video](#) by Moodle.

To delete a topic:

1. Click **Turn editing on** at the top of the course page on the right-hand side.



2. Click the **Edit** button that corresponds with the topic you would like to edit.



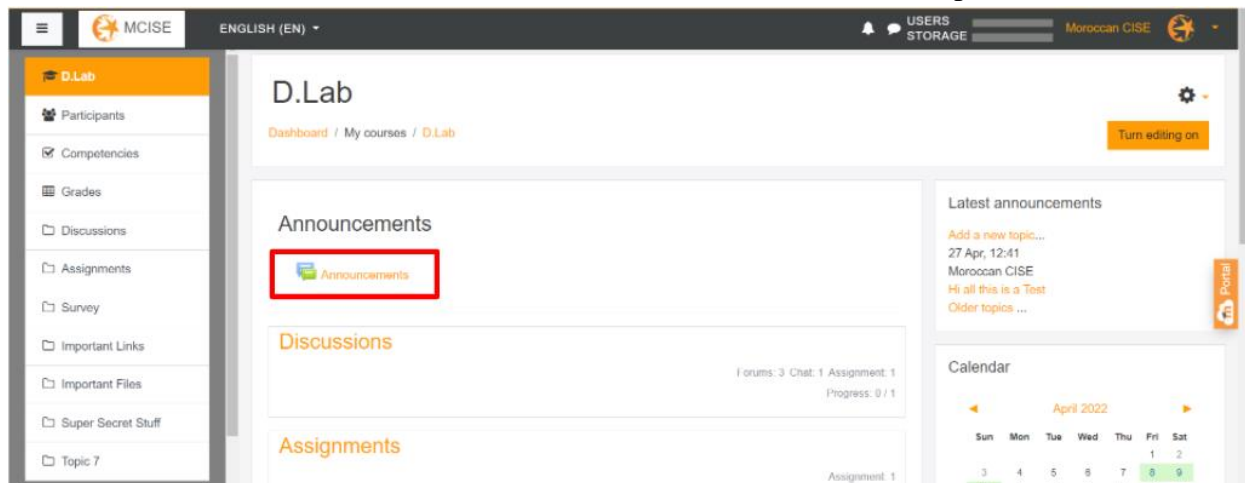
3. Click **Delete topic**.
4. Click **Delete**.

Making an Announcement

An announcement will be sent to the students of the course and will show up in the **Latest announcements** block on the right side of the screen. You must begin on the course homepage to make an announcement for the course.

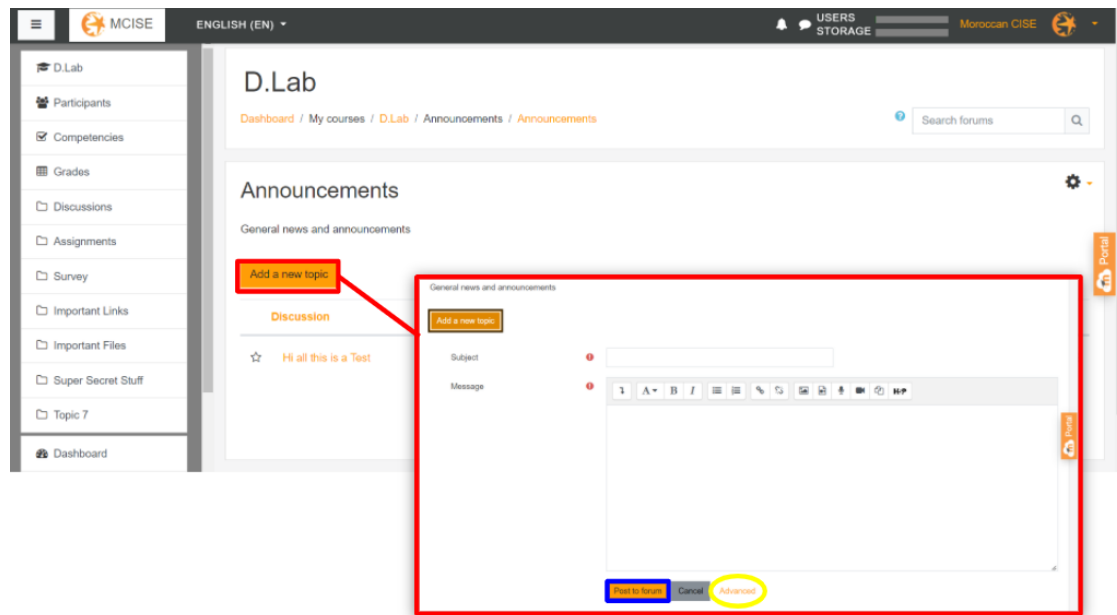
To make an announcement:

1. Click on the **Announcements** button under the Announcements topic.



2. Click **Add new topic** (see red outline below).
3. Enter a subject and a message for your announcement.
4. Click **Post to forum** (see blue outline below).

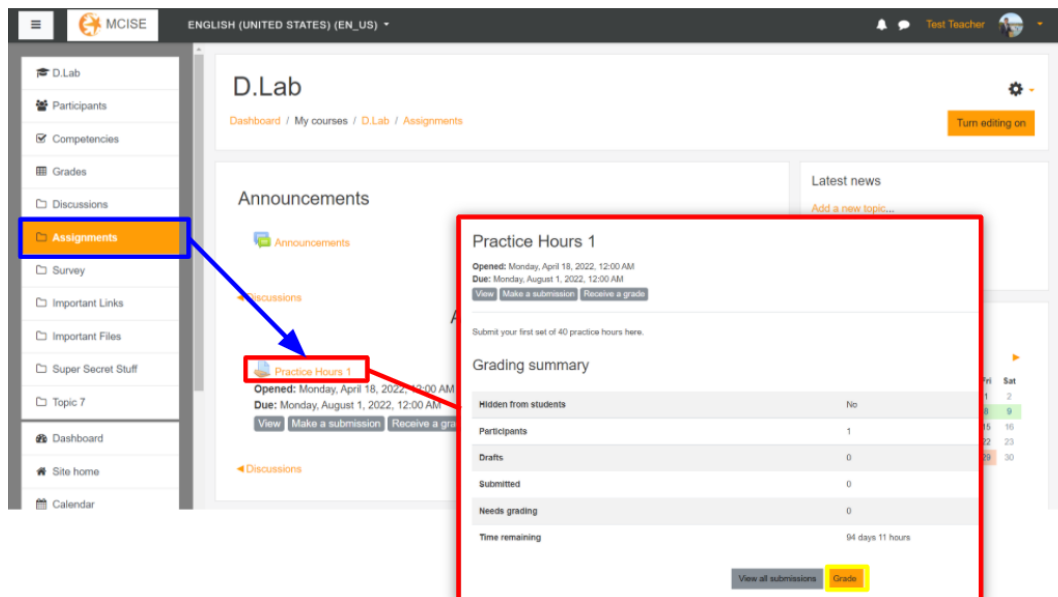
Note: The **Advanced** button (circled in yellow) provides additional settings, such as attachments and tags.



Grading an Assignment

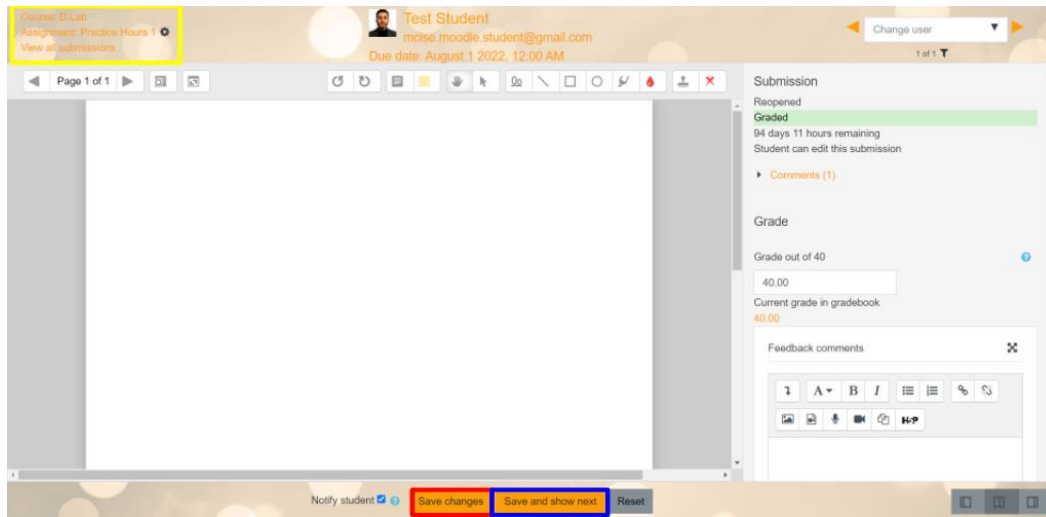
To grade an assignment:

1. Click on the assignment you wish to grade.
2. Click **Grade**.



3. Review the student's submission, which you can see on the left side of the screen.
4. Enter a grade in the **Grade** text entry box.
5. Enter any comments you have in the **Feedback Comments** text entry box.
6. Save your changes.
 - If you want to continue grading students' submissions, click **Save and show next** (outlined in blue).

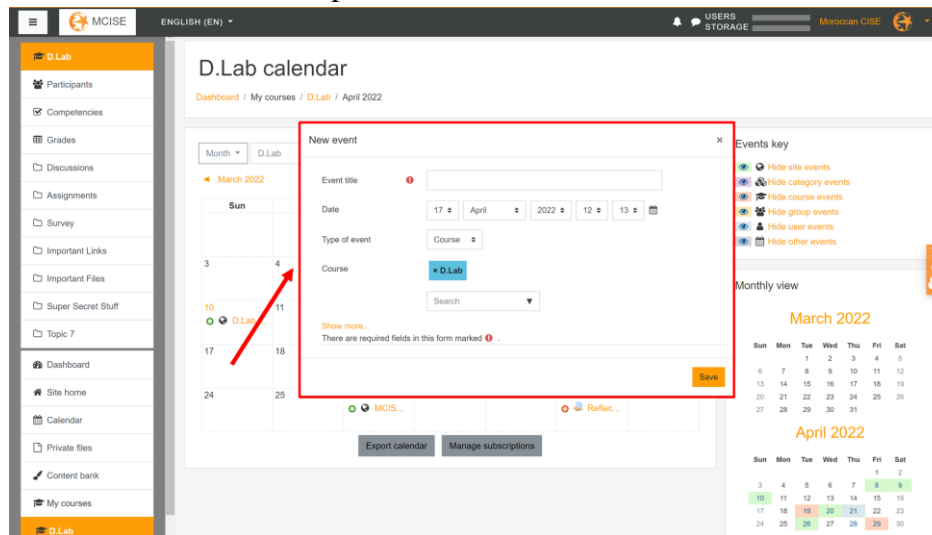
- If you are finished grading, click **Save Changes** (outlined in red), and exit the grading screen by clicking on one of the buttons in the top-left corner of the screen (outlined in yellow).



Adding Events to the Calendar

To add an event to the calendar:

1. Click the **Calendar** button on the left-hand side of the screen.
2. Click the date for which you want to add the event.
3. Add the details about the event, such as the title and the start time.
4. Click **Save**. The event will be posted to the calendar.

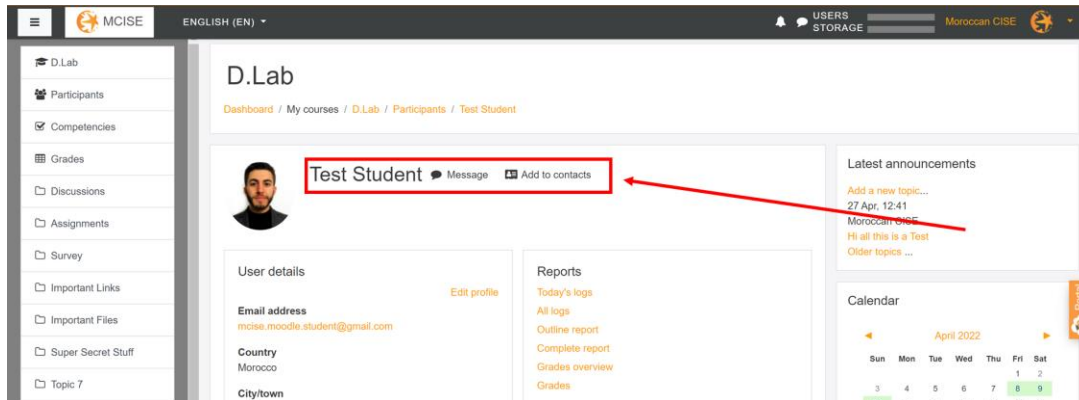


Sending a Private Message

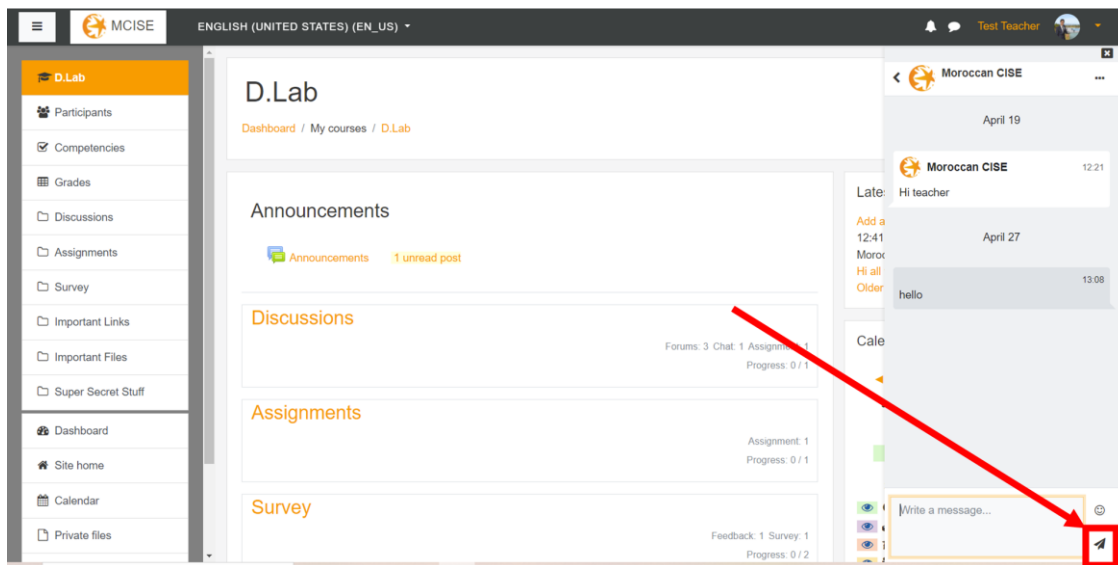
To send a private message to a user you do not already have a conversation with:

1. Click **Participants** on the left-hand side of the screen.
2. Click on the name of the student you want to start the conversation with.

3. Click on the **Message** button next to the student's name. The chat window will open on the right side of the screen.



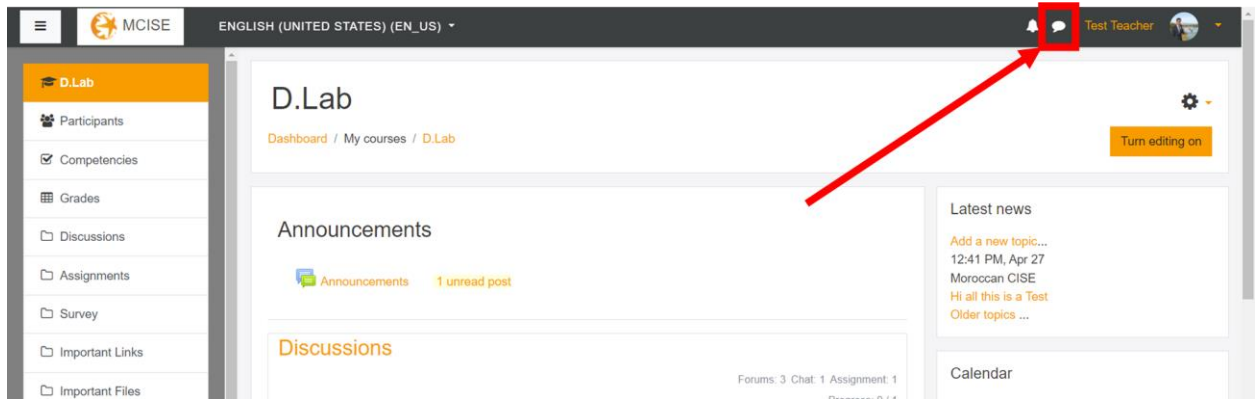
4. Type your message in the text box at the bottom of the screen.
5. Click the **Send** button.



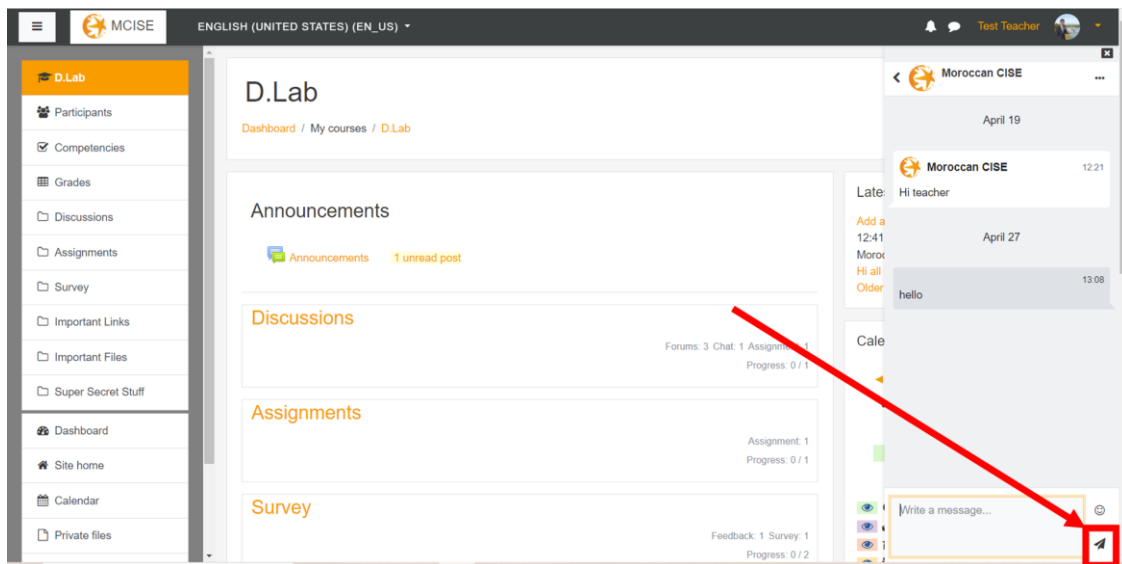
Responding to a Private Message

To respond to a private message, or to continue a conversation you have already started:

1. Click the **Chat** button on the top of the screen.



2. Click on the conversation you want to continue.
3. Enter your message in the text box at the bottom of the screen.
4. Click the **Send** button.



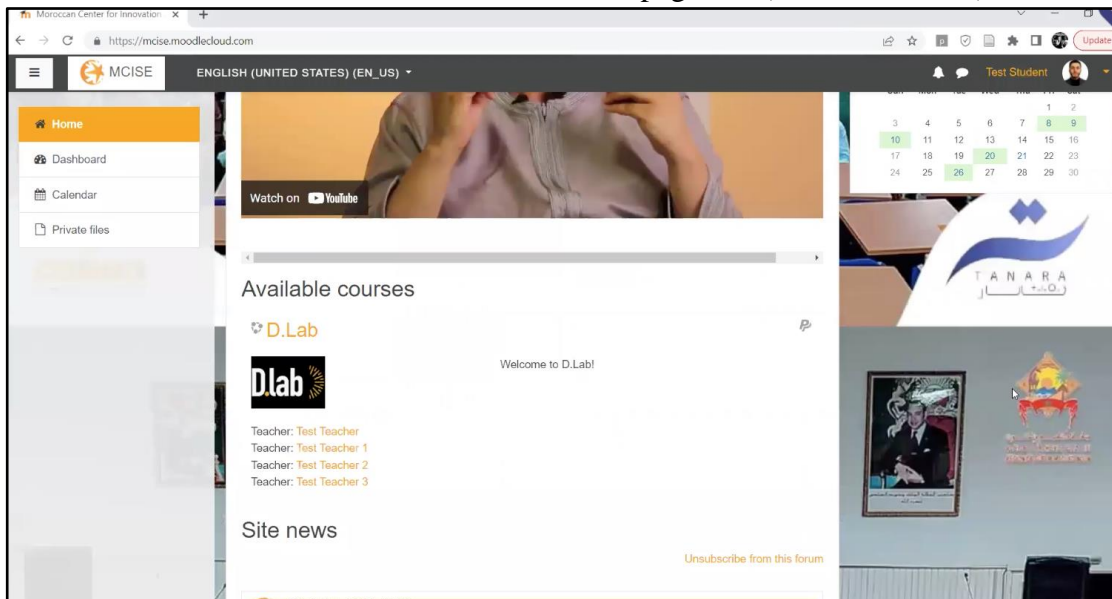
Course Enrollment

Enrolling in a Course (Students)

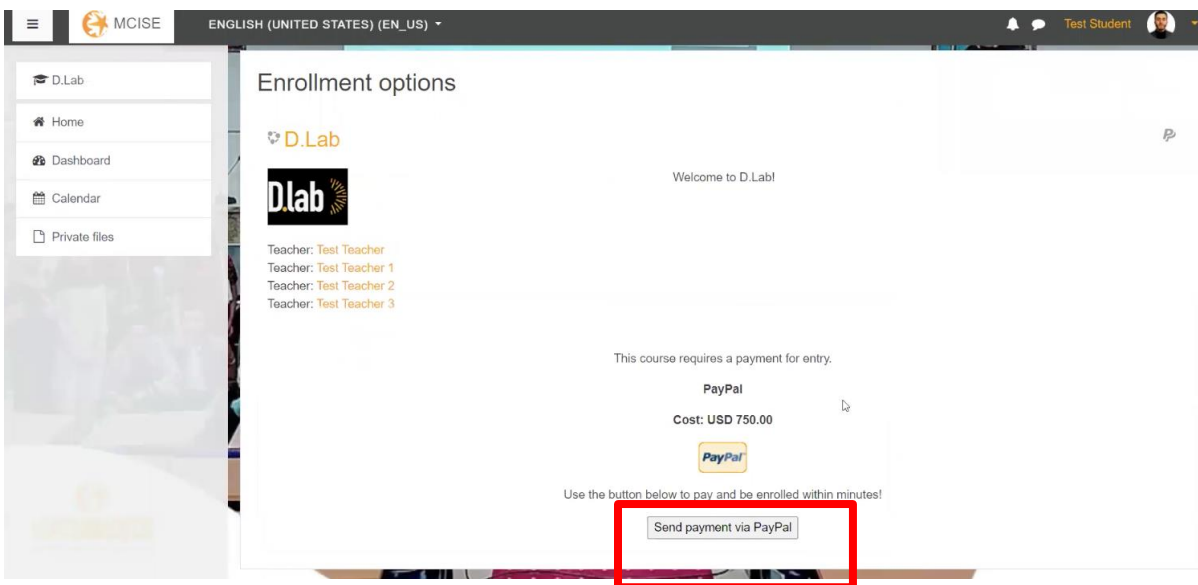
Students can enroll in a course to access the course's content, assignment, and grade.

Courses are listed under Available Courses.

1. Scroll down to **Available Courses** on the homepage site (as shown below).



2. Click on the course hyperlink to access the course.
3. If the course requires payment, click **Send payment via PayPal** and enter Paypal information.



4. After payment, you will be taken to the **Course homepage**.
Congratulations; you have successfully enrolled yourself in a course!

For instructions on enrolling users in bulk or creating cohorts of users, refer to this [Moodle documentation](#).

Enrolling in a Course (Teachers)

As a teacher, you can enroll in a course by asking the administrator to assign you the “Teacher” role for that course.

You should not have to pay for the course if there is a paywall (See [this documentation](#) on how to assign roles).

APPENDIX J: IRB APPROVAL

WORCESTER POLYTECHNIC INSTITUTE

100 INSTITUTE ROAD, WORCESTER MA 01609 USA

Institutional Review Board

FWA #00030698 - HHS #00007374

Notification of IRB Approval

Date: 04-Mar-2022

PI: Karen Oates K

Protocol Number: IRB-22-0418

Protocol Title: Developing a Digital Platform to Teach Entrepreneurship Pedagogy in Morocco

Approved Study Personnel: DeMaio, Christopher~Lynn, Elisabeth~Wagner, Hunter M~Tran, Ngoc Uyen Vy~Oates, Karen K~Stafford, Kenneth A~Davis, John-Michael~

Effective Date: 04-Mar-2022

Exemption Category: 3

Sponsor*:

The WPI Institutional Review Board (IRB) has reviewed the materials submitted with regard to the above-mentioned protocol. We have determined that this research is exempt from further IRB review under 45 CFR § 46.104 (d). For a detailed description of the categories of exempt research, please refer to the [IRB website](#).

The study is approved indefinitely unless terminated sooner (in writing) by yourself or the WPI IRB. Amendments or changes to the research that might alter this specific approval must be submitted to the WPI IRB for review and may require a full IRB application in order for the research to continue. You are also required to report any adverse events with regard to your study subjects or their data.

Changes to the research which might affect its exempt status must be submitted to the WPI IRB for review and approval before such changes are put into practice. A full IRB application may be required in order for the research to continue.

Please contact the IRB at irb@wpi.edu if you have any questions.