

Self-Direct to Learn, Self-Direct to Live: Eight MOOC Studies in an Increasingly Self- Directed Learning World

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Wayne State University

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Talk Outline



- MOOC News and Trends
- Study #1: Systematic Review of MOOC Research
- Study #2: Expanded Review of MOOC Research
- Study #3: MOOC Instructor ID Considerations and Challenges
- Study #4: MOOC ID for Self-directed Learning
- Study #5: MOOC Instructor Personalization

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Talk Outline

- Study #6: Cultural Sensitivity in MOOCs
- Study #7: MOOC Learners and SDL
- Study #8: SEM and MOOC Learning



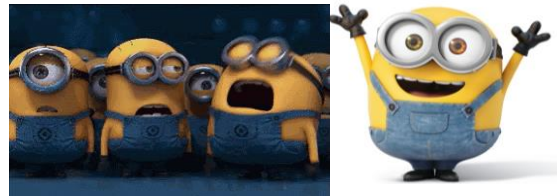
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Polls

Poll #1: Who in here has taken a MOOC?

**Poll #2: Are you happy or frustrated
when you take a MOOC?**



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MOOC Trends and Recent Data

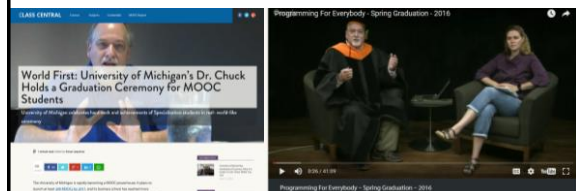


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June 14, 2016 (MOOC graduation ceremonies) Chapter 15: Learning About MOOCs by Talking to Students

Charles Severance, Univ. of Michigan
Anuar Lequerica, Class Central

<https://www.class-central.com/report/2k-chuck-graduates-celebrates-graduation-speech/>



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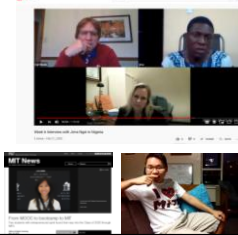
Hundred+ MOOC Clubs February 21, 2020

250 MOOCs and Counting: One Man's Educational Journey, Chronicle of Higher Education

<http://chronicle.com/article/250-MOOCsCounting-One/229397?cid=at>
If the MOOC movement has faded, nobody told Jima Ngei. Mr. Ngei, who lives in Port Harcourt, Nigeria, has completed and passed 250.



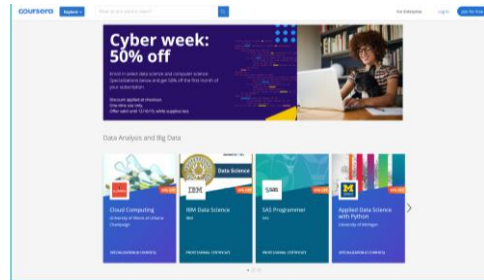
Jima Ngei: "I had this unrelenting fear that this miracle of free access might evaporate soon."



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December 15, 2019

Coursera <no-reply@m.mail.coursera.org> Ends TOMORROW: 50% off top tech Specializations



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December 16, 2019

2020 Impact Report, edX

<https://www.edx.org/sites/default/files/2020-impact-report.pdf>



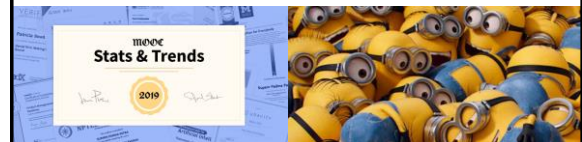
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MOOCs Stats

December 17, 2019

Online Degrees Slowdown: A Review of MOOC Stats and Trends in 2019, Dhawal Shah, Class Central

<https://www.classcentral.com/report/moocs-stats-and-trends-2019/>



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MOOCs Stats

December 17, 2019

A Review of MOOC Stats and Trends in 2019

Dhawal Shah, Class Central
<https://www.classcentral.com/report/moocs-stats-and-trends-2019/>

Here's how the top-5 MOOC providers currently look in terms of users and offerings:

	Learners	Courses	Microcredentials	Degrees
Coursera	45 million	3,800	420	16
edX	24 million	2,640	292	10
Udacity	11.5 million	200	40	1
FutureLearn ^{2,4}	10 million	880	49	23
Swayam ^{2,3}	10 million	1,000	0	0

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MOOCs Stats

December 17, 2019

A Review of MOOC Stats and Trends in 2019

Dhawal Shah, Class Central
<https://www.classcentral.com/report/moocs-stats-and-trends-2019/>

CLASS CENTRAL

110M
Students

900+
Universities

13.5k
Courses

820
Microcredentials

50
MOOC-based degrees

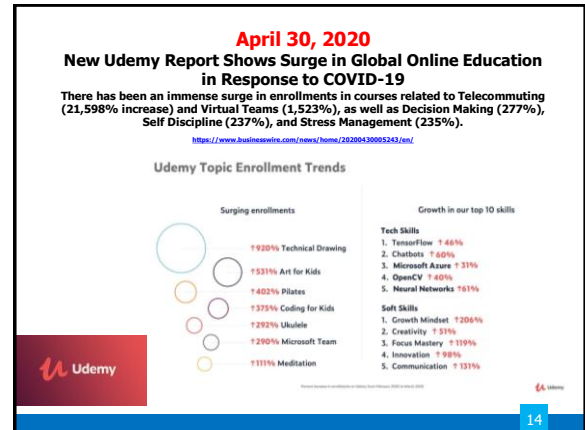
By the Numbers: MOOCs in 2019
Statistics do not include China

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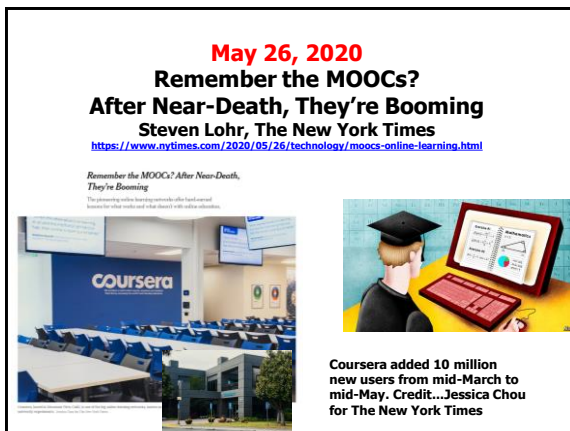
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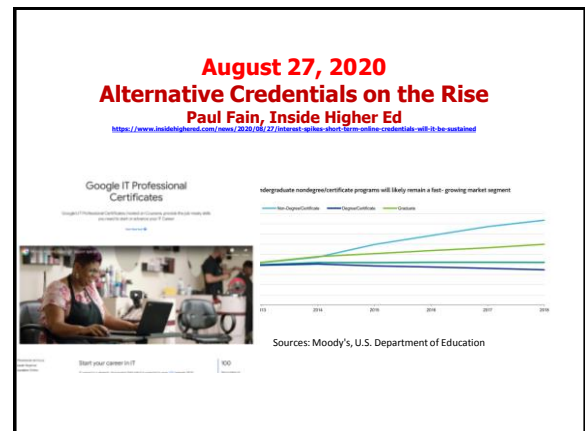
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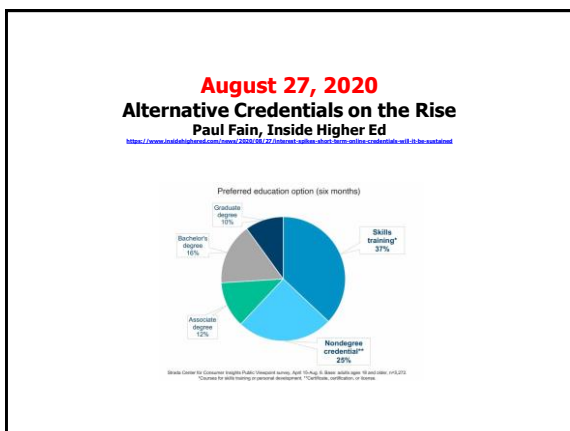
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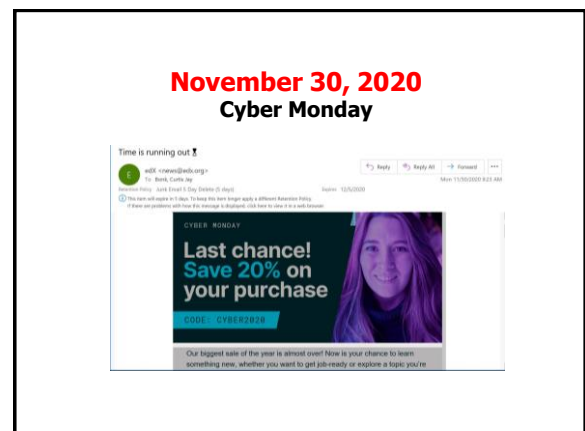
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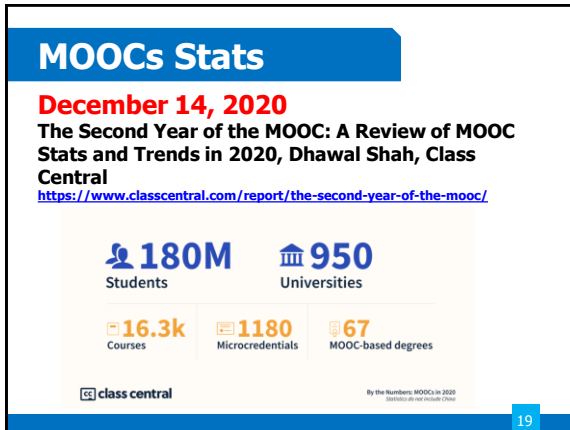
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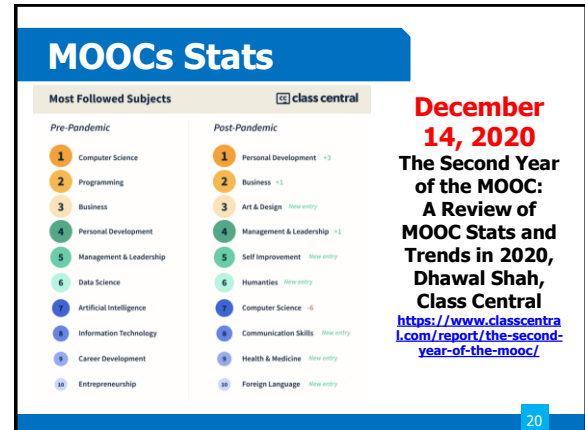
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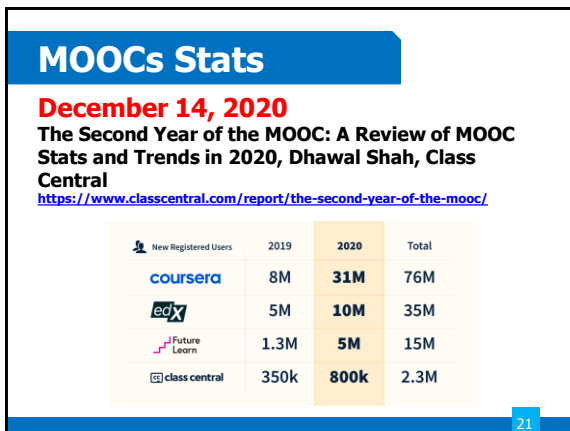
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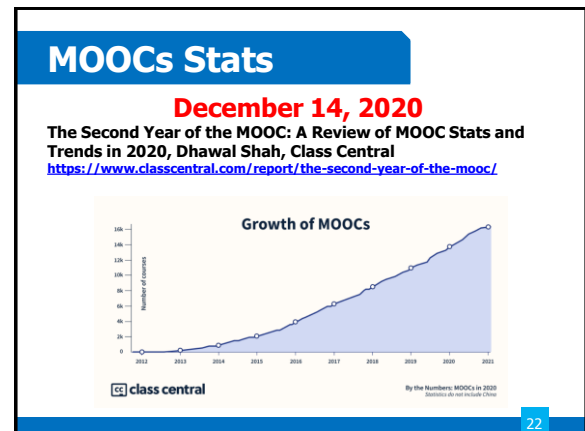
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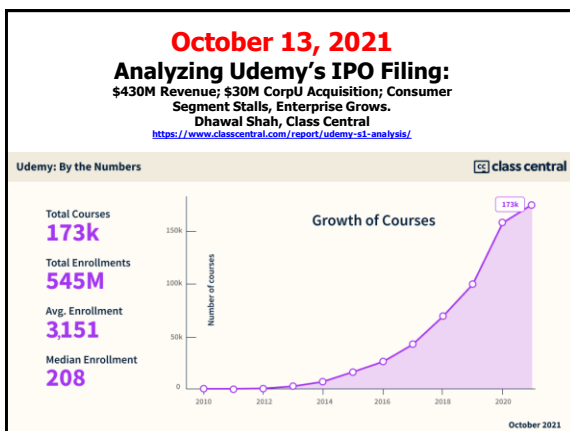
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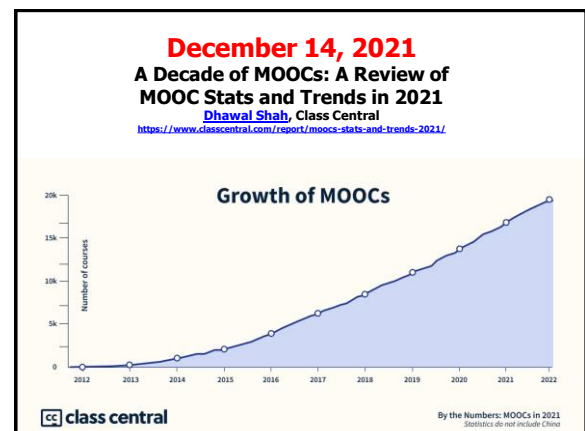
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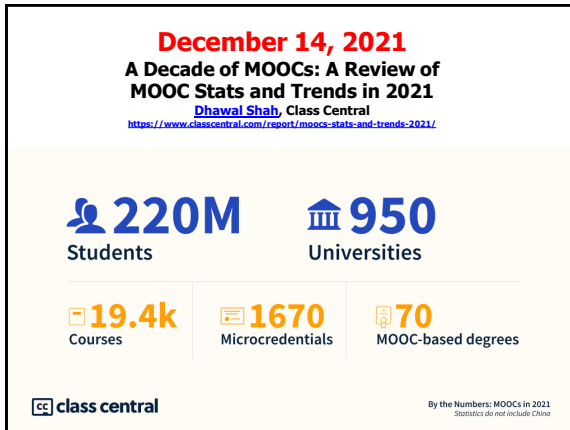
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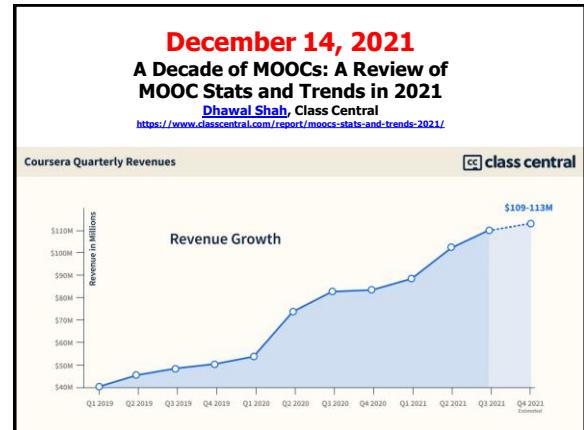
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December 14, 2021
A Decade of MOOCs: A Review of MOOC Stats and Trends in 2021
Dhawal Shah, Class Central
<https://www.classcentral.com/report/mooc-stats-and-trends-2021/>

New Registered Users	2019	2020	2021	Total
coursera	8M	31M	21M	97M
edX	5M	10M	7M	42M
swayam	NA	6M	6M	22M
Future Learn	1.3M	4M	2M	17M

class central

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Polls

Poll #1: Who in here has taken a MOOC?
Poll #2: Are you happy or frustrated when you take a MOOC?

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December 30, 2018
MOOC-Based Degrees, Pricing Chart
IBL News
<https://www.classcentral.com/pricing-charts/mooc-based-degrees>

MOOC-based Degrees Pricing Chart	CLASS CENTRAL	Number of Colleges Offering a Degree	Price
Master's Degree in Accounting	\$20,000	1	\$20,000
Master's Degree in Business Administration (MBA)	\$15,000	1	\$15,000
Master's Degree in Computer Science	\$15,000	1	\$15,000
Master's Degree in Data Science	\$15,000	1	\$15,000
Master's Degree in Education	\$15,000	1	\$15,000
Master's Degree in Engineering	\$15,000	1	\$15,000
Master's Degree in Health Sciences	\$15,000	1	\$15,000
Master's Degree in Information Technology	\$15,000	1	\$15,000
Master's Degree in Law	\$15,000	1	\$15,000
Master's Degree in Life Sciences	\$15,000	1	\$15,000
Master's Degree in Management	\$15,000	1	\$15,000
Master's Degree in Marketing	\$15,000	1	\$15,000
Master's Degree in Public Health	\$15,000	1	\$15,000
Master's Degree in Social Work	\$15,000	1	\$15,000
Master's Degree in Teaching	\$15,000	1	\$15,000
Master's Degree in Urban Planning	\$15,000	1	\$15,000
Master's Degree in Writing	\$15,000	1	\$15,000

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September 26, 2018
The Future of Professional Credentialing ... in an Engagement Announcement
Joshua Kim, Inside Higher Ed
<https://www.insidehighered.com/digital-learning/https://technology-and-learning/future-professional-credentialing-engagement>

INSIDE HIGHER ED

The future bride graduated from the **University of Vermont** with a bachelor's degree in anthropology and is currently pursuing a master's degree in public health. She is employed as a care navigator with Apple.

The future groom graduated from **Worcester Polytechnic Institute** with a bachelor's degree in mechanical engineering and is currently pursuing a master's degree in mechanical engineering. He has been accepted in the **Harvard Business HBX CORE** program and plans to start in November. He is currently working as a technical program manager at Apple.

They are planning on a summer wedding in 2020.

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Khe Foon (Timothy) Hew (2018)

Hew, K. F. (2018). Unpacking the Strategies of Ten Highly Rated MOOCs: Implications for Engaging Students in Large Online Courses. *Teachers College Record*, 120(1). <https://www.coursetalk.com/>

Hew's (2018, p. 1) analyzed 4,565 coursetalk review comments of 10 highly rated MOOCs. He found "six key factors that can engage online [MOOC] participants and nine reasons for participant disaffection."

1. Problem-centric learning supported by clear explanations.
2. Active learning supported by timely feedback (e.g., assignments, projects, discussion).
3. Course resources that cater to participants' learning needs or preferences.
4. Instructor attributes (e.g., passion, enthusiasm, humor, examples).
5. Peer interaction.
6. Instructor availability.



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Quotes: Veletsianos et al. (2015-2016)

"To gain a deeper and more diverse understanding of the MOOC phenomenon, researchers need to use multiple research approaches (e.g., ethnography, phenomenology, discourse analysis) add content to them." (p. 583)

Veletsianos, Collier, & Schneider (2015, May). Digging deeper into learners' experiences in MOOCs: Participation in social networks outside of MOOCs, notetaking and contexts surrounding content consumption. *BJET*, 46(3), 570-587.

"Dependence on Particular Research Methods May Restrict our Understanding of MOOCs."

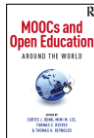
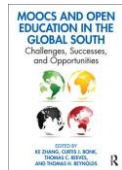
George Veletsianos & Peter Shepherdson's Study (2016). Systematic Analysis and Synthesis of the Empirical MOOC Literature Published in 2013-2015. *JRRODL*. <http://www.jrrodl.org/index.php/jrrodl/article/view/2448/3655>



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MOOC books (2020) and (2015)



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October 22, 2021 Wanted: Billions of Self-Directed Learners



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October 22, 2021 Wanted: Billions of Self-Directed Learners

<https://www.peoplematters.in/article/training-development/the-era-of-self-directed-learning-hrs-new-role-and-strategy-24348>



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Benefits of Self-Directed Learners

<https://discoverpraxis.com/reasons-not-to-go-to-college/>

THE BENEFITS OF SELF-DIRECTED LEARNING

- | | | |
|---|--|---|
| ✓ Teaches you to take initiative and create value | ✓ Promotes self-awareness | ✓ Lets you explore a wider range of interests |
| ✓ Builds self-confidence | ✓ Helps you find a career you find personally fulfilling | ✓ Gives you the practical experience to execute what you've learned |
| ✓ Teaches perseverance and flexibility | ✓ Allows you to learn skills more holistically | |
| ✓ Kindles intrinsic motivation | ✓ Teaches social skills | |



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Study #1 MOOCs Literature Review (2014-2016)

Zhu, M., Sari, A., & Lee, M. M. (2018). A Systematic Review of Research Methods and Topics of the Empirical MOOC Literature (2014-2016). *The Internet and Higher Education*, 37, 31-39.



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Research Purposes & Questions

The purpose was to gain a deeper and more diverse understanding of the current MOOC phenomenon and identify the gap in MOOC empirical studies.

1. What are the research methods researchers employed in empirical MOOC studies?
2. What are the research topics or focuses in MOOC studies?
3. How are researchers of empirical MOOC studies geographically distributed?
4. In terms of the delivery of the MOOC, what are the countries which are attracting the most research?

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Journals of the Articles

No.	Journal	Total
1	International Review of Research in Open and Distance Learning (IRRODL)	31
2	Computers & Education	12
3	British Journal of Educational Technology	9
4	Online Learning	7
5	Distance Education	5
6	Educational Media International	5
7	Internet and Higher Education	5
8	Journal of Computer Assisted Learning	5
9	Computers in Human Behavior	4
10	Open Learning	4
11	Journal of Online Learning and Teaching	3
12	Journal of Asynchronous Learning Network	3

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RQ1 & RQ2

MOOC research focuses and methods

	Quantitative	Qualitative	Mixed methods
Student-focused	39	9	26
Design-focused	19	12	17
Context and impact	9	6	5
Instructor-focused	0	3	2

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RQ2

Specific Focus of MOOC Research (2014-2016)



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RQ3 Locations

Location of MOOC Research Team Members (2014-2016)

UNITED STATES UK SPAIN AUSTRALIA CANADA	CHINA NETHERLANDS TURKEY TAIWAN CHILE	DENMARK EGYPT GERMANY IRELAND PORTUGAL SOUTH KOREA	BANGLADESH BELGIUM CYPRUS ECUADOR GREECE FINLAND ISRAEL HONG KONG MEXICO NEW ZEALAND SAUDI ARABIA SOUTH AFRICA SWEDEN UAE
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Study #2 Systematic Review of MOOC Research Expanded (2009-2019)



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Total Number of Empirical MOOC Studies Published in Different Journals from 2009-2019

Table 1
(Note: the table only includes the top nine journals in terms of the number of empirical MOOC studies)

Journals	Number of empirical studies
International Review of Research in Open and Distributed Learning	51
Computers & Education	22
British Journal of Educational Technology	15
Online Learning	12
Distance Education	11
Journal of Online Learning and Teaching	11
The Internet and Higher Education	10
Computers in Human Behavior	10
Open Learning	8

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Research Methods

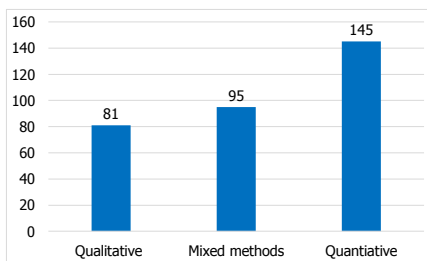


Figure 2. Research methods used in empirical MOOCs studies from 2013-2018 (N=321 studies)

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Data Collection Methods

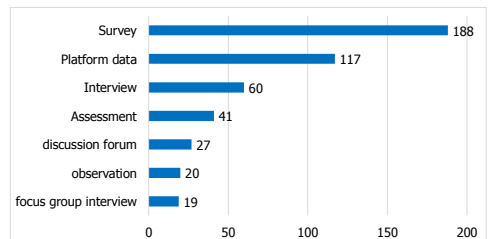


Figure 5. Data collection methods used in empirical MOOCs studies from 2013-2018 (N = 321 studies)

(Note: some studies contain more than one data collection method and this figure only includes the main data collection methods)

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Study #3 MOOCs Design Considerations and Challenges

Zhu, M., Bonk, C. J., & Sari, A. (2018). Instructor experiences designing MOOCs in higher education: Pedagogical, resource, and logistical considerations and challenges. *Online Learning*, 22(4), 203-241.

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Research Background

- **MOOCs can be beneficial to both learners and instructors** (Hew & Cheung, 2014).
- **Instructional design is critical for online learning** (Johnson & Aragon, 2003; Phipps & Merisotis, 1999).
- **Instructors are one of the five main components of MOOCs** (Kop, 2011).
- **Few studies have examined instructional design from MOOC instructors' perspectives** (Margaryan et al., 2015; Watson et al., 2016).

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Research Purpose

The purpose of this study is to provide suggestions for future MOOC instructors and instructional designers in higher education through exploring MOOC design considerations and challenges from the instructor's perspective.

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Research Questions

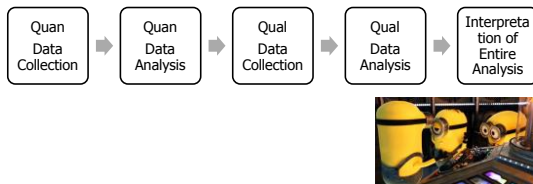
1. What are the design considerations of instructors when designing MOOCs?
2. What challenges do instructors perceive when designing MOOCs?
3. How do instructors address the challenges that they perceive related to MOOCs?

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Research Design

- Sequential mixed methods design (Creswell & Clark, 2017)



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Data Collection

- Data Collection:
 - Survey, interview, and course review
- Participants:
 - 143 survey participants (10% response rate)
 - 12 interviewees



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12 Interviewees

No.	Countries	Subject areas	Platforms
1.	The U.S.	Language and Literacy	Coursera
2.	The U.S.	Education	Coursera
3.	The U.S.	Education	Canvas
4.	The U.S.	Chemistry	Coursera
5.	UK	Medicine and Health	FutureLearn
6.	UK	Language and Literacy	FutureLearn
7.	Hong Kong (China)	Math	Coursera
8.	Mainland China	Math	Coursera
9.	Canada	Psychology	Coursera
10.	Australia	Medicine and Health	Open2Study
11.	Sweden	Computer Science	edX
12.	India	Management	edX

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Data Analysis

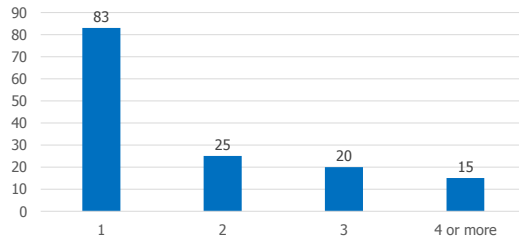
RQs	Data Sources	Data analysis
RQ1	Survey-multiple-choice questions	Descriptive statistics
	Survey-open-ended questions	Content analysis (Elo & Kyngäs, 2008)
	Interview	Content analysis
	MOOC review	Content analysis
RQ2	Survey-multiple-choice questions	Descriptive statistics
	Survey-open-ended questions	Content analysis
	Interview	Content analysis
RQ3	Survey-multiple-choice questions	Descriptive statistics
	Interview	Content analysis

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Research Context

The Number of MOOCs the Instructor has Designed

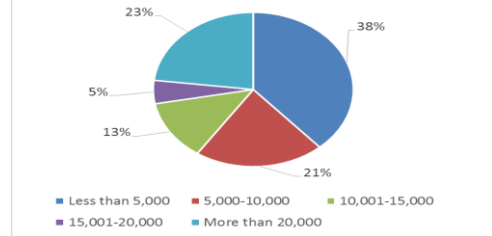


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Research Context

The Number of Learners Enrolled in Recent MOOC



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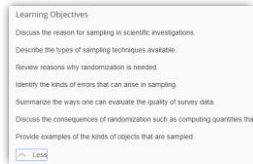
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Findings RQ1

RQ #1. What are the design considerations of instructors when designing MOOCs?

- Learning objectives
- Assessment
- Time for designing MOOC
- Engaging learners

An example of learning objectives:

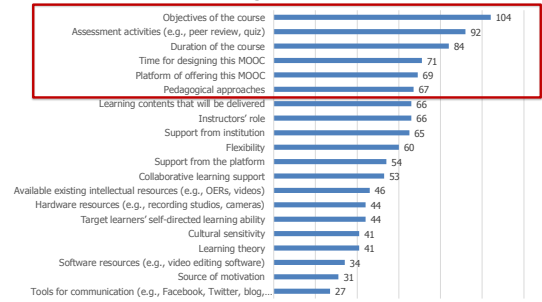


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RQ1 Survey Results

MOOC Design Considerations



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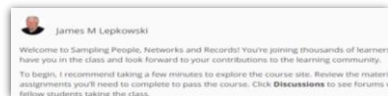
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RQ1 Interview Results

Engage learners

One instructor from US mentioned:

"I engaged people in the forum. So **each week I would write a message that would be the new welcome page for the week** that would say, 'hey come to the forum and ask questions about this or come to the forum introduce yourself'... Of course, I tried to get students to feel like **I was engaged with them during the videos by asking them questions** and telling them to do things during the video."



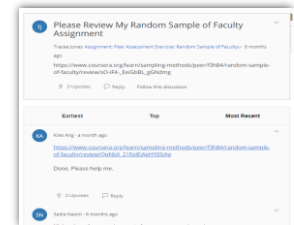
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Findings RQ2

RQ #2. What challenges do instructors perceive when designing MOOCs?

- Assessment methods
- Engaging students' learning
- Time limitation



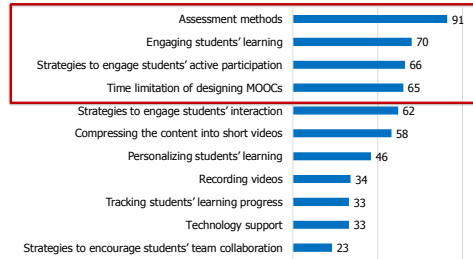
(Note: Above is an example of peer-assessment.)

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RQ2 Survey Results

Design challenges faced by the MOOC instructors



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RQ2 Interview Results

Time limitation

One instructor from education subject mentioned:

"I think one of the challenges is time. It does take a lot of time to get the videos done. **I did not get a course release when I was doing, and it was a side project at the same time as my regular load.**"

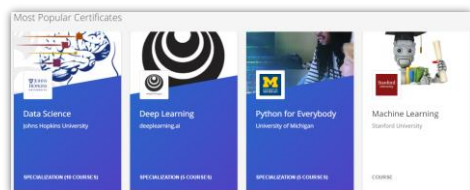


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Findings RQ3

RQ #3. How do instructors address the challenges that they perceive related to MOOCs?

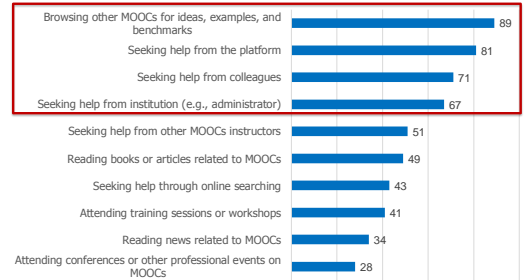
- Explore other MOOC examples
- Seek help from the platform/colleagues/institutions



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RQ3 Survey Results

Ways to Address Challenges



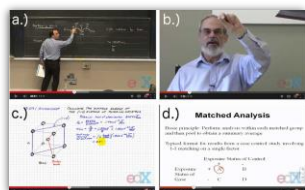
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RQ3 Interview Results

Explore other MOOC examples

One MOOC instructor from the US mentioned:

"When I started making the MOOC, I could see MOOCs that other people had made. So I could see what other people did in terms of having videos with questions embedded in the videos, which I really liked."



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Discussion

- The **time limitation** of creating MOOCs was the primary logistical consideration (Hew & Chung, 2014; Watson et al., 2016) and challenges.
- The **pedagogical factors** were the primary design considerations (Watson et al., 2016) and challenges in MOOC design.
- The **assessment and engagement strategies** are the main considerations as well as challenges.

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Study #4 MOOCs Instructional Design to Facilitate Participants' Self- directed Learning

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Key Terms

Self-directed learning (SDL) (Garrison, 1997)

- (1) self-management
- (2) self-monitoring
- (3) motivation



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Research Background

- **Learners need self-directed learning skills and strategies to be successful in MOOCs** (Halawa, Greene, & Mitchell, 2014; Littlejohn & Milligan, 2016), as there is a lack of personalized interaction with teachers.
- **Self-directness of a learner might vary in different learning environments which means that the learners could be more self-directed in one learning environment than another** (Hiemstra, 1994).

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Research Background

- **Instructional design can greatly influence students' interaction and engagement** (Garrison & Cleveland-Innes, 2005) **and success in online learning** (Song, Singleton, Hill, & Koh, 2004; Swan, 2001).
- However, few studies have examined instructional design and the delivery of instruction using MOOCs from instructor perspectives (Margaryan et al., 2015; Watson et al., 2016); **especially lacking is research on instructors' perception of SDL and how they design MOOCs to facilitate students' SDL.**

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Research Purpose

- **The purpose is to inform instructors or instructional designers and MOOC providers of the current practices of designing MOOCs to facilitate learners' SDL.**



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Research Questions

1. How do MOOC instructors perceive participant SDL skills?
2. How do MOOC instructors perceive their facilitation of participant SDL skills?
3. How do instructors design and deliver MOOCs to facilitate participant SDL skills?
 - a. How is technology being used by MOOC instructors to support the development of participant SDL skills?
 - b. What technology features or functions do MOOC instructors want to have to improve their facilitation of MOOC participant SDL skills?

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Research Design

Explanatory sequential mixed methods design

(Creswell & Clark, 2017)



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Data Collections

Survey:

- Volunteer sampling (Creswell & Clark, 2017)
- 198 instructors responded to the survey (10% response rate)

Interview:

- Homogeneous purposeful sampling (Creswell & Clark, 2017; Patton, 2002)
- Maximal variation sampling (Creswell & Clark, 2017)
- 22 interviewees

MOOC review:

- Reviewed 22 interviewees' MOOCs

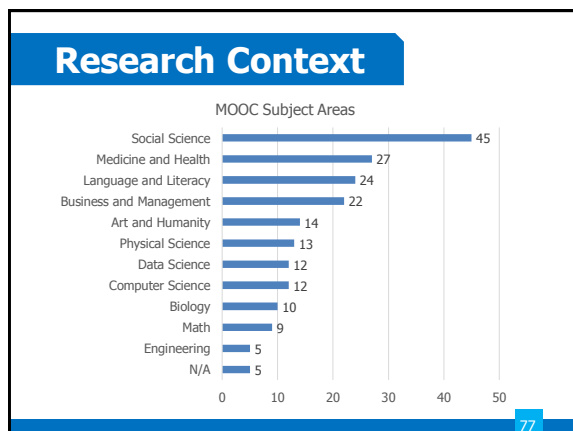


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Pseudonym	Country	Subject area	Platform	Gender	No. of Q/B	No. of M	Mode of the M
Lucas	US	Social science	edX	M	0	1	I without T
Branden	US	Education	Udacity	M	0	5 or more	Self-paced
Logan	US	Literacy and Language	Coursera	M	5 or more	5 or more	I with T
Erinna	US	Literacy and Language	Coursera	F	2	1	Self-paced
Jason	US	Science	edX	M	1	1	I with T
Jackson	US	Medicine and health	Coursera	M	5 or more	1	Self-paced
Samuel	US	Education	FutureLearn	M	4	3	Self-paced
Hannah	US	Education	Blackboard	F	5 or more	1	I with T
Ashley	US	Education	EdX	F	0	5 or more	I with T
Andrew	UK	Art	FutureLearn	M	0	3	I with T
Emily	UK	Medicine and health	FutureLearn	F	2	2	I with T
Aiden	UK	Social science	FutureLearn	M	0	1	Self-paced
Henry	UK	Social science	FutureLearn	M	0	1	Self-paced
Joseph	UK	Medicine and health	FutureLearn	M	1	1	Self-paced
Joshua	UK	Literacy and language	FutureLearn	M	2	2	I with T
Mason	Australia	Education	Coursera	M	5 or more	1	I with T
Ethan	Australia	Business	Coursera	M	3	1	I without T
Ben	Australia	Social science	edX	M	1	1	I with T
Paul	France	Computer Science	Coursera	M	1	1	I with T
Fernando	Belgium	Research methods	Blackboard	M	5 or more	3	I with T
Jacob	Netherland	Science	Coursera	M	0	1	I with T
Dylan	Israel	Science	Coursera	M	5 or more	3	I without T

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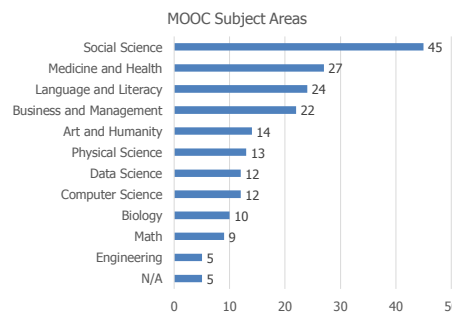
Data Analysis

RQs	Data Sources	Data analysis	Tools
RQ1	Survey	Descriptive statistics	SPSS
	Interview	Content analysis (Elo & Kyngäs, 2008)	NVivo
RQ2	Survey	Descriptive statistics	SPSS
	Interview	Content analysis	NVivo
RQ3	Interview	Content analysis	NVivo
	Course review	Content analysis	NVivo

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Research Context

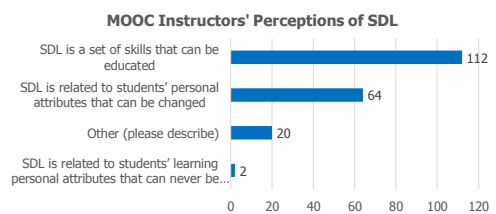


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RQ1 Perceptions of SDL

- A majority of the MOOC instructors thought that these skills or attributes are not static, and that SDL as a set of skills can be educated or students' personal attributes that can be changed.



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RQ1 Interview Results

- Emma's understanding of SDL is more related to self-management and motivation. She said:
"When I think about self-directed learning, I think about students **managing their time and managing the coursework on their own, and how it fits into their schedules and their lives, how they interact with materials, what's going to keep them engaged.**"

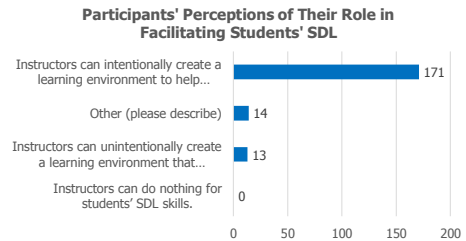


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RQ2 Perceptions of Facilitation of SDL

- **Most of MOOC instructors thought that they can intentionally or unintentionally facilitate students' SDL.**



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RQ2 Interview Results

- **Ashely emphasized the importance of both instructors' facilitation and students' SDL skills. She said:**
"The participant has a lot of flexibility on how they approach the content. I mean, obviously, we have things like assignments. We have things like online forums. And there're ways that we scaffold the learning experience. But there still is a lot of choice for the learner."



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RQ3 Strategies to Facilitate SDL

- **Students' intrinsic motivation plays an important role. However, extrinsic motivation provided by the MOOCs might help transfer extrinsic motivation to intrinsic motivation.**

Motivations	Strategies
Entering motivation	MOOC instructors helped students identify the needs and goals of learning and sense of achievement.
Task motivation	MOOC instructors motivated students through instruction, learning materials, feedback, and learning community.

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RQ3 Learning Community



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RQ3 Strategies to Facilitate SDL

- **Both internal feedback and external feedback were provided to help students' self-monitoring.**

Self-monitor	Strategies
Internal feedback	Cognition MOOC instructors provided quizzes for self-assessment, tutorial on technology use, learning advice, navigation of the course, progress indicators, resources, and instructional modeling, etc.
	Meta-cog MOOC instructors encouraged students to reflect and think critically by providing reflection questions and building learning community.
External feedback	MOOC instructors, teaching assistants, and peers were involved in providing external feedback.

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RQ3 Self-assessment (i.e., embedded quizzes)

2. Who was the typical student in the Grammar Translation approach?

Correct
Yes, this is correct

1/1 point

1. Why was the grammar translation approach taught?

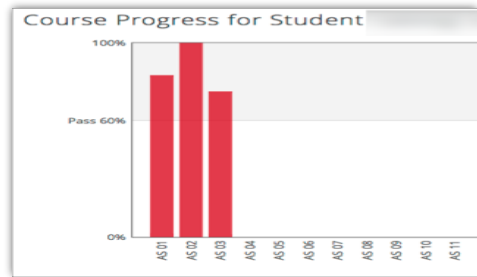
to teach values and morals.
This should be selected

to better prepare travelers for interacting with people in a foreign country.
This should not be selected
This should not be checked.

to teach correct grammar and language rules.
This should be selected

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RQ3 Progress Indicators



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RQ3 External Feedback: Peer-assessment (e.g., 3 peers assigned to review each assignment)

REQUIRED	GRADE	DUE
Quiz Module 2 Review Quiz 20 min		Nov 19
Peer-graded Assignment Critical Evaluation of the 2 Approa... 2h		Nov 22
Review Your Peers Critical Evaluation of the 2 Approa...		Nov 25

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RQ3 Strategies to Facilitate SDL

- They helped students' self-management concerning setting learning goals, time management, resources and support management although among the three elements of SDL, MOOC instructors had less control over students' management.

Self-management	Strategies
Enactment of learning goals	Providing discussion questions, reflections, survey, and appreciation students' learning goals.
Time management	Providing time frame, progress indicator, short learning units, and flexible timeline.
Management of resources and support	Providing flexible learning resources, peer-assessment, accessibilities, clear expectations, and short learning units.

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RQ3 Time Management (e.g., time advisories and estimates)

START WEEK 1 WEEK 2 WEEK 3 WEEK 4

REQUIRED

Pick up where you left off
Don't let the great things you learned fade away! Restart your deadlines and complete your assignments every week.

Reset my deadlines

WEEK 1 Estimated Time: 1h 7m

The Swing of the Pendulum: A Brief Look at ESL History

REQUIRED

Videos 7 min left

Readings 20 min left

Practice Exercises 20 min left

Quiz
Module 1 Review Quiz
20 min

GRADE **DUE**
Nov 12

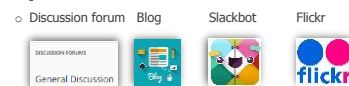
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RQ3-a. Tech Used for SDL

Synchronous communication technologies



Asynchronous communication technologies



Multimedia (e.g., video and graphics)

Feedback technologies

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Discussion

- **SDL can be Changed**
- **MOOC Instructors can Facilitate SDL**
- **Strategies to Facilitate SDL:** A variety of strategies can be used to facilitate student SDL skills in terms of motivation, self-monitor, and self-management.
- **Tech for SDL:** Tech plays a vital role in facilitating SDL skills.
- **Tech expectations:** Adaptive learning systems, artificial intelligent systems, and learning analytics were expected to have to support SDL.

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Implications

- **For MOOC instructors and Instructional Designers**
 - Build learning community
 - Inspire intrinsic motivation
 - Personalize learning
- **For MOOC providers**
 - Create a personalized learning environment
 - Provide learning analytics to support learning and teaching

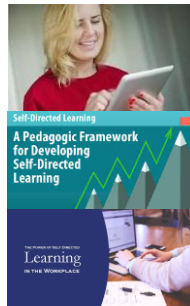


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Top 10 Strategies to Facilitate SDL in MOOCs

1. Helping students set their own learning goals.
2. Building learning community.
3. Offering immediate feedback.
4. Embedding quizzes for self-assessment.
5. Providing progress indicators.
6. Providing reflection questions.
7. Designing short learning units.
8. Providing flexible timelines.
9. Highlighting estimated time frames.
10. Making available optional learning materials.



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Top 10 Strategies to Facilitate SDL in MOOCs

1. Helping students set their own learning goals.

Example:

"I have asked, at the first page of course, why they're taking the course. So that is the goal. A lot of people say, 'I'm a teacher. And I want to do the stuff with my kids. Or I want to update my knowledge. Or I'm retired and I want to learn this.'"



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Top 10 Strategies to Facilitate SDL in MOOCs

2. Building learning community.

Joshua from the UK mentioned: We use a lot of resources that already exist. And then we use the MOOC discussion board as a place to where they, kind of, point out and say, "I've seen this. And this is useful. Well, I use this, and this is good. I created this."

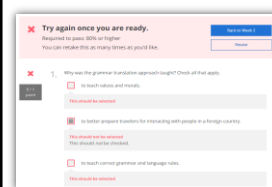


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Top 10 Strategies to Facilitate SDL in MOOCs

3. Offering immediate feedback.
4. Embedding quizzes for self-assessment.

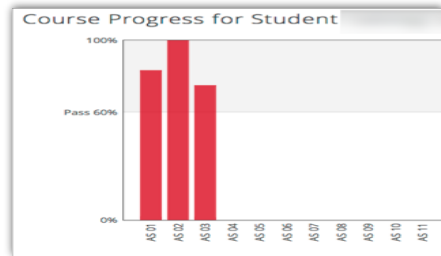


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Top 10 Strategies to Facilitate SDL in MOOCs

5. Providing progress indicators



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Top 10 Strategies to Facilitate SDL in MOOCs

6. Providing reflection questions.

We introduced kind of moments that video was stopped and there was a question. The student had to think of it a bit. Sometimes it was kind of a rhetorical question. There wasn't even no answer required. But it was just a pause for a while to let the student reflect. (Jacob)



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Top 10 Strategies to Facilitate SDL in MOOCs

7. Designing short learning units.

- ✓ Video: Introduction to Regression 6 min
- ✓ Video: Introduction: Basic Least Squares 6 min

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Top 10 Strategies to Facilitate SDL in MOOCs

8. Providing flexible timelines.

You've already completed 71% of your course! Reset your deadlines so you can finish the rest!

[Reset my deadlines](#)

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100

Top 10 Strategies to Facilitate SDL in MOOCs

9. Highlighting estimated time frames.

- ✓ Video: 1.2 - Popular Music and Classical Music Compared 6 min
- 🕒 Quiz: Popular Music and Classical Music Compared 2 questions [Overdue Jun 27, 2:59 AM EDT](#)
- ✓ Video: 1.3 - Music and Emotions 4 min
- ✓ Video: 1.4 - How Do We Hear Music? Sound Waves and the Ear 6 min
- 🕒 Quiz: How Do We Hear Music? Sound Waves and the Ear 5 questions [Overdue Jun 27, 2:59 AM EDT](#)

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Top 10 Strategies to Facilitate SDL in MOOCs

10. Making available optional learning materials.

🕒 Reading: BASIC: A Blanket Around the Earth 10 min

🕒 Reading: ADVANCED: A Blanket Around the Earth 10 min

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10 More Strategies to Facilitate SDL in MOOCs

MOOC: Infection Prevention and Control (IPC) for Novel Corona virus (COVID-19) from OpenWHO (English Version)

11. Structured learning environment:

- Clearly stated the learning objectives.
- Course details stated the expected time to complete the course.
- The syllabus, number of course modules, and title of each module.



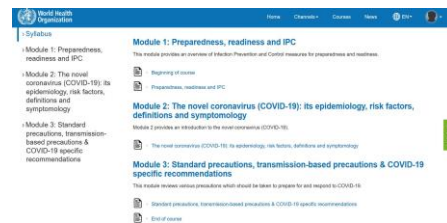
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10 More Strategies to Facilitate SDL in MOOCs

11. Structure continued...

Graphic or visual organizations for essential material. The text on screen matched the narration enforcing the redundancy principle.



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10 More Strategies to Facilitate SDL in MOOCs

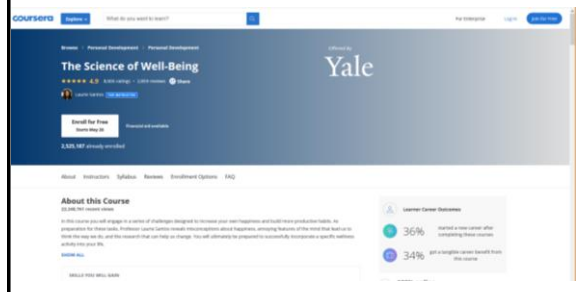
12. On completion of modules participants get a certificate.



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The Science of Well-Being, Yale



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10 More Strategies to Facilitate SDL in MOOCs

13. Week overview. The course is divided into week-long segments, and each week is chunked into manageable parts. Very importantly for the participant to be able to anticipate what can get done in one sitting, the length of each video is included.



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10 More Strategies to Facilitate SDL in MOOCs

14. Lecture recorded and captions added.



Figure 3: Lecture Example



Caption added to video



Video of student audience

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10 More Strategies to Facilitate SDL in MOOCs

14. Continued...Lecture video transcripts.

The full transcript of each video recording is shown below the video player, with the current point in video highlighted as it plays:

Saying in these reference points that are kind of crazy? What's my reference point for what my salary should be as a Yale professor? I could look to Paul Bloom, who's my colleague, who also teaches Coursera courses. He's in the psychology department. He might be a good reference point. That might be okay for me to compare myself to. But it would be bad if I was comparing my salary against Beyoncé's because that's just crazy. I'm not going to be Beyoncé. I'm not going to make her money. I'm not going to be as beautiful as her. So we would assume that our minds, if they're going to use reference points, use reasonable ones. But it turns out that our minds don't do that. They seem to soak in anything around us as a reference point. And given that I'm watching Beyoncé videos, this could be messing me up. And so this is what O'Guinn and Schrum looked at. They wanted to see whether people who were exposed to crazier and crazier reference points, more unrealistic standards of salaries and incomes, actually got messed up. And here was their hypothesis. People who watched lots of TV are faced with people with crazy salaries, crazy incomes, crazy beauty levels, crazy stuff. Is that messing people up? In other words, just watching a lot of TV where you see things like the Real Housewives and Empire and all this stuff, does that

Figure 7: Video Transcript Example

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10 More Strategies to Facilitate SDL in MOOCs

15. Quick check tasks.

The video lectures contain one or two "quick check" pop-up questions to assess understanding (and attention):

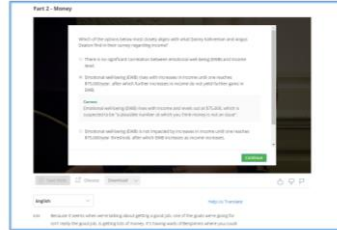


Figure 8: Quick Check Example

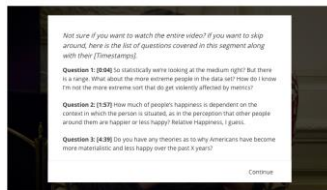
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10 More Strategies to Facilitate SDL in MOOCs

16. Providing students with self-selection options.

There is the choice to watch all of the videos, read all of the materials, and submit all of the assignments, or there are choices all along the way to "cut corners" and take in only what the participant wants to.

Question & Answer



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10 More Strategies to Facilitate SDL in MOOCs

17. Visuals showing tasks completed.

What do you want to learn?

You have completed all of the assignments that are currently due.

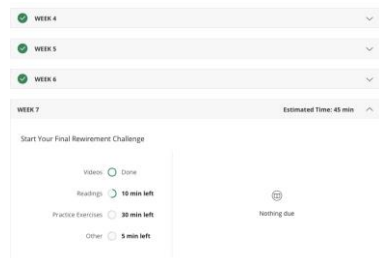
Item	Status	Due	Weight	Grade
Week 1 Quiz	Passed	Apr 20 2:00 AM EDT	10%	100%
Week 2 Quiz	Passed	Apr 27 2:00 AM EDT	10%	100%
Week 3 Quiz	Passed	May 4 2:00 AM EDT	10%	83.33%
Week 4 Quiz	Passed	May 11 2:00 AM EDT	10%	100%
Week 5 Quiz	Passed	May 18 2:00 AM EDT	10%	100%

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10 More Strategies to Facilitate SDL in MOOCs

18. Visuals showing work progress.



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10 More Strategies to Facilitate SDL in MOOCs

19. Rewirements (assignments) for putting the material to practice (e.g. Random Acts of Kindness, Make A Social Connection, Let's Get Physical, Meditate!, Sleep!, Gratitude Letter/Visit, Savoring, etc.)

Daily Gratitude Journal

Gratitude is a positive emotional state in which one recognizes and appreciates what one has received in life. Research shows that taking time to experience gratitude can make you happier and even healthier. **For the next seven days, you will take 5-10 minutes each night to write down five things for which you are grateful.** They can be little things or big things. But you really have to focus on them and actually write them down (Again, try to develop a tracking method works for you and utilize a note on your phone, a daily calendar, a special notebook, etc.). You can just write a word or short phrase, but as you write these things down, take a moment to be mindful of the things you're writing about (e.g., imagine the person or thing you're writing about, etc.). This exercise should take at least five minutes. Do this each night for the whole week.

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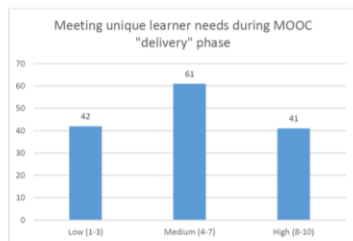


Figure 4. Effort placed on meeting unique learner needs when delivering most recent MOOC. Note: on a scale of 1 (low) to 10 (high) (n=144).

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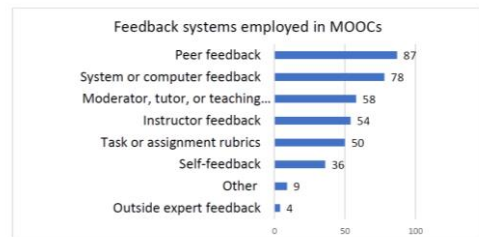


Figure 5. Number of MOOCs that offer different types of learner feedback (n=135).

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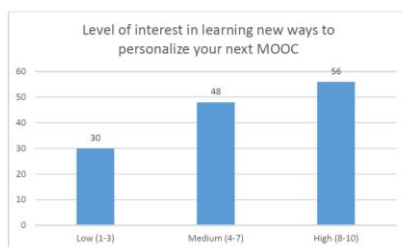
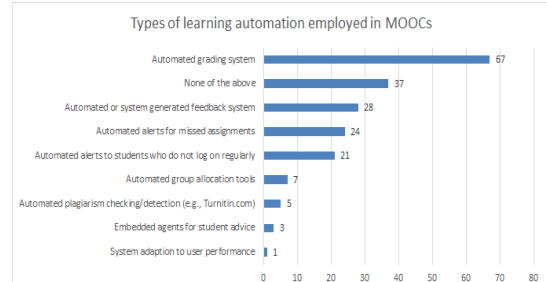


Figure 7. MOOC instructor interest in learning new ways to personalize their next MOOC offer on a scale of 1 (low) to 10 (high) (n=134).

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MOOC Study #6



Zhu, M., Sabir, N., Bonk, C. J., Sari, A., Xu, S., & Kim, M. (2021, April). Addressing learner cultural diversity in MOOC design and delivery: Strategies and practices of instructors and experts. *Turkish Online Journal of Distance Education*, 22(2), 1-25. <https://doi.org/10.17718/tojde.906468>.

125

Zhu, M., Sabir, N., Bonk, C. J., Sari, A., Xu, S., & Kim, M. (2021, April). Addressing learner cultural diversity in MOOC design and delivery: Strategies and practices of instructors and experts. *Turkish Online Journal of Distance Education*, 22(2), 1-25. <https://doi.org/10.17718/tojde.906468>.



Figure 1. Instructor Experience Teaching Online/Blended Courses prior to Teaching their Recent MOOC. Note: on a scale of 1 (low) to 10 (high) (n= 148)

126

Zhu, M., Sabir, N., Bonk, C. J., Sari, A., Xu., S., & Kim, M. (2021, April). Addressing learner cultural diversity in MOOC design and delivery: Strategies and practices of instructors and experts. *Turkish Online Journal of Distance Education*, 22(2), 1-25. <https://doi.org/10.17718/tojde.906468>.

Table 1. Instructional Practices of MOOC Instructors to Address the Variety of Learner Competencies and Needs (n=142)

Items	Response percent	Response count
Establish learner-based discussion forums	81.0%	115
Embed supplementary course materials	78.2%	111
Post timely course announcements and emails	63.4%	90
Record video tutorials or walkthroughs	40.8%	58
Emphasize project-based learning, over exams	34.5%	49
Using preexisting online videos (e.g., Lynda.com, TED talks, YouTube, etc.)	32.4%	46
Other	26.1%	37
Hold synchronous lectures, meetings, and events (e.g., Skype, Google Hangouts, Zoom, etc.)	23.9%	34
Establish study groups	19.0%	27
Establish learner reflection journals or blogs	16.2%	23
Schedule virtual office hours and meetings	14.1%	20
Offer face-to-face meet-up opportunities	7.8%	10

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Zhu, M., Sabir, N., Bonk, C. J., Sari, A., Xu., S., & Kim, M. (2021, April). Addressing learner cultural diversity in MOOC design and delivery: Strategies and practices of instructors and experts. *Turkish Online Journal of Distance Education*, 22(2), 1-25. <https://doi.org/10.17718/tojde.906468>.

Table 2. Items Instructors Provided in their Most Recent MOOC (n = 126)

Items the current MOOC covered	Percent	Count
Optional readings, videos, or other materials	74.6%	94
Learner selected incentives (e.g., certificates, badges, course credit, etc., options)	64.29%	81
Options with course tasks and assignments	38.10%	48
Learner discussion and negotiation of content	36.51%	46
Two or more media elements to learn the same content	31.75%	40
Learner determined or contributed content	30.16%	38
Learner selected learning pathways (i.e., different routes to learn the same content)	19.05%	24
Learner portfolios of course accomplishments	16.67%	21
Choice in team or collaborative partners (i.e., self-formed teams)	12.70%	16

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Zhu, M., Sabir, N., Bonk, C. J., Sari, A., Xu., S., & Kim, M. (2021, April). Addressing learner cultural diversity in MOOC design and delivery: Strategies and practices of instructors and experts. *Turkish Online Journal of Distance Education*, 22(2), 1-25. <https://doi.org/10.17718/tojde.906468>.

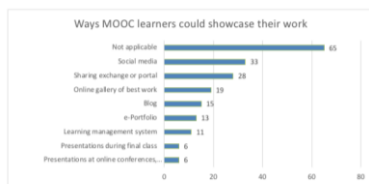


Figure 2. Methods by Which MOOC Learners Could Showcase their Work [Note on a scale of 1 (low) to 10 (high)] (n= 130)

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Zhu, M., Sabir, N., Bonk, C. J., Sari, A., Xu., S., & Kim, M. (2021, April). Addressing learner cultural diversity in MOOC design and delivery: Strategies and practices of instructors and experts. *Turkish Online Journal of Distance Education*, 22(2), 1-25. <https://doi.org/10.17718/tojde.906468>.

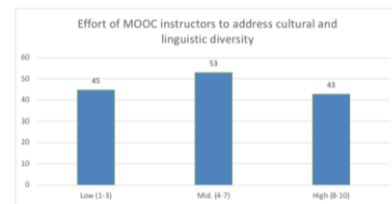


Figure 3. The Perceived Effort of MOOC Instructors to Address Cultural and Linguistic Diversity [Note on a scale of 1 (low) to 10 (high)] (n= 141)

130

130

Zhu, M., Sabir, N., Bonk, C. J., Sari, A., Xu., S., & Kim, M. (2021, April). Addressing learner cultural diversity in MOOC design and delivery: Strategies and practices of instructors and experts. *Turkish Online Journal of Distance Education*, 22(2), 1-25. <https://doi.org/10.17718/tojde.906468>.



Figure 4. MOOC Instructors' Instructional Practices to Address Cultural Diversity (n=133)

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Table 3. Best Practice Recommendations by MOOC and Open Education Experts for Addressing Cultural Sensitivity (n=25)

MOOC Stage	Category	Approach
Design	Communication	Provide possible alternative back channels for traditional discussion boards (e.g., WhatsApp, WeChat, Kik, etc.). Consider the different ways learners read information - Some languages are not presented in a linear format.
Course design		Leverage straightforward course design as intricate or nested course designs can be difficult to convert across languages and platforms. Ensure visual examples (i.e., icons and captions) repeated throughout the course appeal to as many stakeholders as possible.
Media use		Consider different audiences through perspective taking, when incorporating multimedia. Overreliance on visual rhetoric (e.g., visual images) alone to communicate can be problematic. Use caution when including videos on an external website, such as YouTube, as content could be restricted for certain users. Remember that converting text into various languages is easier than videos, and it takes much longer to create a video. Slideshows should not overwhelm learners with text; try to use symbols, icons, and other visual elements.
Reuse and remix		Ensure inclusivity by openly licensing all educational materials developed for MOOCs, to guarantee the permissions and freedoms required for translation, adaptation, re-use, redistribution, and repackaging. Understand the legal differences and barriers between copyright, copyleft, and public. Consider the technology used in development. Ask yourself, "Does it assist reuse and remixing?" Weigh the potential of other instructors' capabilities in remixing/revising the content and provide support where appropriate.
Technology accessibility		Appreciate the power of mobile learning in many regions of the world, learning occurs through mobile devices. Courses should be pedagogically and technologically developed with this mindset. Identify the range of learner digital literacy skills. Encourage learners to create low bandwidth versions of multimedia for those in low bandwidth areas. Foster a learner community where learners help learners in downloading, translating, and hosting multimedia.
Working with a design team		Encourage course/content to be developed by teams consisting of members from various institutions, countries, and/or cultures. Actively prepare MOOC instructors and online course designers for cultural sensitivity.

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Delivery	Attire and mannerisms	Remain presentable and well-dressed when appearing in multimedia. Be thoughtful about body movement and overall gestures, as well as images of hand gestures, as different cultures decipher meaning in diverse ways.
	Culture specific	Asian audiences may not be the quickest to voice their opinions and prefer to be spoken to with deference, politely, and softly. Not all learners read left to right. For example, some Middle Eastern learners read content right to left, and some Asian learners read content top to bottom. Content including case situations or scenarios involving alcohol, the incorporation of pictures of dogs (from some nations), political humor/satire, and the use of quotes from religious figures can prove to be controversial and potentially offensive.
	Developing a sense of community	Avoid references to current events that may only be shared by a small subgroup. Urge learners to meet locally or amongst themselves to share materials and address any sensitive concerns. Avoid issues related to religion and politics. Minimize distractions and possible negative responses by staying away from controversial topics.
	Emphasis on expertise	Respect the deep-seated cultural differences related to the following: the value of expert vs. learner-originated knowledge; deference to experts; and willingness to engage in discussion and critique - with the most noticeable contrasts between those educated in Anglo-Saxon education systems and in Confucianist ones. Have instructions/directions at the ready, just as a backup, for those who tend to respect authority and prefer following directions.
	Language and translations	Make subtitles and transcriptions, when possible, available in multiple languages based on intended audiences. This also empowers hard of hearing learners. Even when English is the primary or secondary language of the target audience, consider making MOOC content available in the major dialect(s) of the country. Identify any cultural aspects of resources disseminated as understandings and meanings may not be exact when translated; each linguistic group has its own scientific history and culture. Jokes and humor, in general, can be easily misinterpreted.

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Table 4. Approaches Employed by MOOC Instructors to Enhance Access for Learners with Different Backgrounds and Technology (n=35)	
Category	Approach
Collaboration	Work alongside various university divisions (e.g., international office, student support, university expert, and language department). Pilot the course with international learners.
Communication, feedback, and language	Offer multiple communication channels. Use simple, slow, and clear language. Do not focus on language or grammar when commenting on forum posts.
Content	Create material that is acceptable for various cultures. Keep cultural differences in mind when designing and producing the material. Emphasize materials which accommodate for various learning preferences. Share personal stories, to some degree, for recording lessons in and around personal spaces. Follow target country's compliance rules and regulations.
Course instruction	Ensure material is kept at a non-expert level. Provide detailed outline of the topics. Arrange open course work where everyone can choose to work individually. Provide background information and course expectations.
Multimedia use	Strive to include captioned or transcribed videos and screencasts. Ensure videos are kept simple and short and include animations in presentations. Leverage free textbooks and open resources. Attempt to provide PDF documents and Word version of materials. Provide text reader or read aloud options, when possible.
Optional resources	Offer supplemental or optional materials.
Technology accessibility	Course materials should be device agnostic, easy to use, and easy to access. Materials can be used on a computer, tablet, smartphone application, or mobile phone. Provide materials that use low bandwidth and make class activities browser based. Make multimedia interactive apps more user-friendly by not engaging Flash-based platforms. Encourage simple navigation. Create user-directed FAQs. Videos and transcripts should be available for download later.

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MOOC Study #7

MOOC Learners and SDL

Zhu, M., Bonk, C. J., & Berri, S. (in press). Fostering self-directed learning in MOOCs: Motivation, learning strategies, and instruction. *Online Learning*



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Research Questions

1. What motivated individuals to enroll in MOOCs?
2. What were the learning strategies that helped learners' SDL in MOOCs?
3. What were the design and instructional elements of MOOCs that facilitated learners' SDL?

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Table 1
Fifteen Interviewees' Demographic Information

Pseudonyms	Gender	Countries	Occupations
Abdullahman	M	Turkey	Teacher
Ali	M	Yemen	Student
Alina	F	The UK	Student
Betty	F	Albania	Engineer
Chang	M	Canada	Athlete
Dan	M	Mexico	Professor
Helen	F	Indonesia	Administrative assistant
Jacob	M	The US	Retired management consultant
Jane	F	The US	Educator
Joe	M	The UK	Retired engineer
Melena	F	Germany	Student
Mostapha	F	Egypt	Student
Sandy	F	The US	Student
Sarah	F	The US	Between jobs
Sophia	F	The Netherlands	Retired office manager

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Table 2
Coding Themes

Themes	Sub-themes
1. Motivation	Intrinsic motivation Extrinsic motivation
2. Learning strategies	Task strategies Self-monitoring Self-management Self-assessment
3. Instructional elements that support SDL	The discussion boards and instructors' involvement The flexibility of the courses Clear learning goals The authenticity of the content Small learning units

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RQ1. Intrinsic Motivation

Jacob, a retired management consultant from the US, expressed his motive behind enrolling in MOOCs as strictly intrinsic, "there's no reward. **I'm retired. It's really just [that] I get very interested in topics. I realize holes in my knowledge and try to fill the holes.**"

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RQ1. Extrinsic Motivation

Besides educational purposes, **some participants enrolled in MOOCs to help with their career development.** For example, Sarah, who received her Ph.D. degree and was in between jobs at the time, selected topics such as anatomy, MatLab software, oncology, biology, and neuroscience. Sarah explained the purpose for taking these types of MOOCs was: **To acquire and improve my knowledge as a medical physicist...I consider my resume when selecting MOOC. I choose courses related to my professional field to add them to my curriculum;** otherwise, there would be a period without being in contact with my profession.

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RQ2. Learning Strategies

RQ2: What were the Learning Strategies that Helped Learners' SDL in MOOCs?

Dan considered the progress bar to be a good indication of his progress, and it also created a healthy competition among the learners. Seeing where he was at in the course compared to the other learners gave him a push. He stated, **"All the progress bar with milestones, with a small quiz that doesn't count for the evaluation, but they're good for you to check if I'm really learning. And, for example, I like when you have these kinds of nice competition[s], right. Everyone starts a MOOC at the same time, but you see that these weeks you progress faster than other members in the MOOC."**

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RQ2. Learning Strategies

RQ2: What were the Learning Strategies that Helped Learners' SDL in MOOCs?

Note taking: Dan stated that his main learning strategy was notetaking: "I always have my little notebook for the MOOC that I'm working on or I'm studying. **And whatever videos or whatever exercise that I was doing, I was always taking notes...**"

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RQ2. Self-monitoring

To help her self-monitoring, Melena noted how enriching her knowledge and knowing new things that she did not know before, along with doing well on the quizzes and tests, were vital indications of her progress. She explained, **"Usually, there is a test after each week. Performing it, I can see in which topic I have the biggest gaps, or I got it well. Moreover, if I apply it in other areas of my life and it can also be seen then."**

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RQ2. Self-management

Dan, the participant that enrolled in MOOCs as a learner and also taught MOOCs, described how **he dedicated a certain time to work on MOOCs.** For the most part, **he allocated the mornings for reading and the afternoons for writing:** For me, I'm a researcher. I'm better at writing papers in that afternoon and reading in the morning... Also, I try to schedule my time for the MOOC as everyone scheduled. This is time to go to the gym or whatever.

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RQ3. Design Elements

RQ3: What Design and Instructional Elements of MOOCs Facilitate Learners' SDL from the Student's Perspective?

Alina believed that having worksheets or a set of questions after each module was the most helpful strategy to evaluate her learning step by step. **Being able to answer the questions after each module** gave her a sense of how much knowledge she retained before starting the next module. Similarly, Sandy elaborated upon how quizzes and tests were helpful, but she wished they were more advanced and included questions and answers rather than only multiple-choice questions.

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RQ3. Design Elements

Design Element: Clear Goals

As Dan explained: **"Some tips at the opening of your MOOC saying: 'hey guys, this is a MOOC that requires you a certain amount of hours per week. And there is a strong deadline for delivering homework and during your quizzes.'"**

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RQ3. Design Elements

Design Element: Authentic Examples

One participant, Helen, believed that **authentic examples, resources, and visuals that some instructors demonstrated in their courses helped maintain her curiosity**. In our interview, she explained: When I studied the brain, **the professor showed the real brain**. Like, she took us to the laboratory and showed us how the brains, how they did it, they did things in the laboratory. So, I find it fascinating. I find it very interesting. Even though for the test I try to read, but for understanding and looking at the real thing, the visualization is very good.

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RQ3. Design Elements

Design Element: Flexibility

Sandy, a former perfectionist, **described her MOOC experience as life-changing**. In this situation, the learner felt more comfortable directing her own learning rather than being pressured to follow a stricter schedule. When asked to describe her MOOCs experience, she explained, **"It helped me realize that I enjoy learning a lot more when I can just be a little more casual about it. I just find it a lot more enjoyable to learn. I think when I'm enjoying it more, I probably actually learn a lot more."**

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RQ3. Design Elements

Design element- small learning units

As Joe explained:

I think what's really good is keeping it into small chunks. I'm going to say, roughly speaking, 3 to 7 minutes long because that makes it easy for you to put it down and pick it up again in small bits.

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RQ3. Responsive Feedback

Design Element: Discussion board and feedback.

Jacob sadly acknowledged that: **"I'll ask [the professor] a question today. I'll type in a question on my computer in the forum. It may be 2 to 3 weeks before I get a reply."** Ali expressed that "it would be great to communicate with professors." Similarly, Sarah explained that what affected her experience the most was the **"lack of real-time interaction with the teacher."**

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Study #8: Self-Directed learning in MOOCs:

Exploring the Relationships among motivation, self-monitoring, and self-management, Zhu, Bonk, & Doo, 2020, ETR&D (SEM: Survey of 322 MOOC Learners)



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Research Questions

- H1: Motivation positively affects self-monitoring of MOOC students.
- H2: Motivation positively affects self-management of MOOC students.
- H3: Self-monitoring positively affects self-management of MOOC students.
- H4: Self-monitoring mediates the relationship between learning motivation and self-management of MOOC instructors.

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Study #8: Self-Directed learning in MOOCs: Exploring the Relationships among motivation, self-monitoring, and self-management, Zhu, Bonk, & Doo, 2020, ETR&D (SEM: Survey of 322 MOOC Learners)

Table 7 Direct and indirect effects of each variable in the research model

Paths	Total effect	Direct effect	Indirect effect
H1: Motivation → Self-monitoring	.647	.647***	
H2: Motivation → Self-management	.561	.137	.424*
H3: Self-monitoring → Self-management	.655	.655***	

*** $p < .001$, ** $p < .01$, * $p < .05$

Fig 5 The results of hypothesis testing



Note 4. *** $p < .001$, ** $p < .01$, * $p < .05$

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What's the Future?



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Any Questions?

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Slides and Proceedings Paper at TrainingShare.com:
<http://www.trainingshare.com> (go to "Archived Talks")

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