

THE RAPID TRANSITION FROM OFFLINE TO ONLINE - THE TEACHING AND LEARNING EXPERIENCES IN ENGINEERING EDUCATION

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In a Nutshell...

The Pandemic has forced the universities to expediate the implementation of blended learning

No significant difference in the academic performance between face-to-face classes and the online classes

Despite the learning experience is affected, students still able to understand, and apply the knowledge, and complete the assessments to demonstrate the learning outcomes.

What Happened since 2020?

89.4%, or 1.5 billion students from 184 countries must face the disruption of the learning.

IHE continue the learning sessions through the online learning sessions

Online model
VS
hybrid or hyflex model

UNESCO introduced comprehensive distance learning strategies

Online model VS hybrid or hyflex model

- Adjust curricular objectives and prioritise humanitarian, social caring;
- Examine the readiness and choose the most relevant and context-sensitive technological solutions;
- Increase the technological and content preparedness to ensure the continuity of education and learning;
- Ensure equity and inclusion;
- Protect learners' privacy and data security;
- Support teachers to plan and facilitate distance learning, and engage parents and caregivers;
- Blend student-centred teaching, monitoring and assessment methodologies to ensure the effectiveness of distance learning; and
- Plan for sustainability and long-term goals.

Face-to-face Learning and Online Learning

asynchronous
vs synchronous
learning

Hybrid learning

Flipped
classroom

Hybrid Flexible
(Hyflex)
learning

Teaching and Learning during Circuit Breaker – Singapore

- Circuit Breaker – 7 April 2020 – 1 June 2020



Online Learning is the mode of conduct

- Followed by three phase of opening from June to December 2020, and Heightened alert in 2021

Special arrangements for laboratory works



- Students are back to school starting from September 2021



Assessments were conducted online

Challenges

Difficulties in handing courses with heavy calculations

- Graphic tablet were purchased and provided to all lecturers who needed to perform heavy writing in the lecture.

Shortage of internet bandwidth

- Students were not required to turn on their video during the lecture

Laboratory were not accessible

- Laboratory were conducted through video observations, and laboratory only allowed for essential works

Converting all assessments to online assessments

- Sufficient briefings and practices were provided to students for familiarisation

Students' Performance Analyses

- Course: Engineering Thermodynamics
- Testing cohorts: 2019 (face-to-face), 2020 (Online), 2021 (Online)
- Course contents were identical from 2019 to 2021.
- No change in the assessment components and lecturers.

■ The hypotheses were established:

- *There is no significant difference in academic performance for students who do face-to-face teaching and online teaching in Singapore*

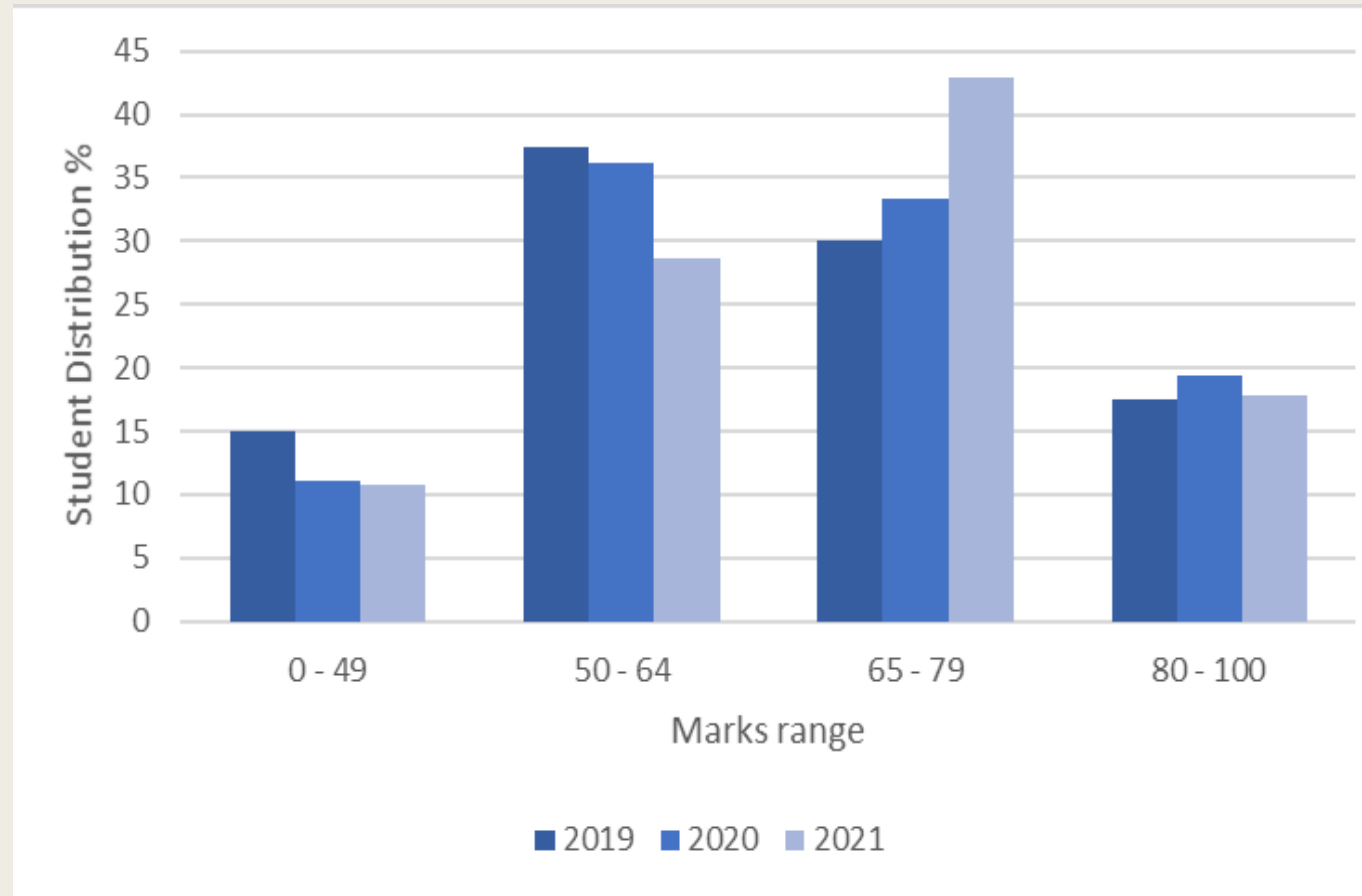
Year	Student Number
2019	40
2020	36
2021	28

Enrolment number for Thermodynamics for years 2019, 2020 and 2021 in NAIHE

The comparison of students' performance for face-to-face teaching (2019) and online teaching (2020, 2021).

The mean and standard deviation for the marks obtained by students for face-to-face teaching (2019) and online teaching (2020, 2021)

Year	Mean	Standard Deviation
2019	61.72	18.07
2020	64.90	15.79
2021	63.49	19.10



t-Test scores for face-face teaching (2019) and online teaching (2020)

	2019	2020
Mean	61.7218	64.89636
Variance	335.0696	256.3134
Observations	40	36
t Stat	-0.80643	
P(T<=t) two-tail	0.42258	
t Critical two-tail	1.992543	

t-Test scores for face-face teaching (2019) and online teaching (2021)

	2019	2020
Mean	61.7218	63.48849
Variance	335.0696	378.2002
Observations	40	28
t Stat	-0.37766	
P(T<=t) two-tail	0.353557	
t Critical two-tail	1.672522	

Conclusion

The Pandemic has forced the universities to expediate the implementation of blended learning

No significant difference in the academic performance between face-to-face classes and the online classes

Despite the learning experience is affected, students still able to understand, and apply the knowledge, and complete the assessments to demonstrate the learning outcomes.

Authors' Final Thoughts

The online assessment does not able to effectively measure the soft skills among students. How can we measure such soft skills through online assessments?

Is examination still an effective way to measure students' grasp of engineering knowledge? Or rather, what is the best assessment mode to measure if student is ready with engineering knowledge?

Is the use of technology limits students' creativity and ability to think critically? At the worse case, does it really affect students' focus or attention towards their job/learning?



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