



# VIRTUAL LABORATORY LEARNING IN MICROBIOLOGY DURING COVID-19 PANDEMIC



Arunee Suvarnajata, Tanit Boonsiri\*, Nitchatorn Sungsirin, Sirachat Nitchapanit, Piyanate Kesakomol, Pimwan Thongdee, Ketsara Khamsaen, Phattarawadee Nilphet, and Veerachai Watanaveeradej

Department of Microbiology, Phramongkutklao College of Medicine, 317 Rajvithi Road, Ratchathewi, Bangkok 10400, Thailand

## Background

Laboratory integrated-case based learning (LI-CBL) in an infectious disease course of a pre-clinical curriculum in 2021 was compelled to convert into online due to COVID-19 pandemic. Missing of traditional laboratory practices in LI-CBL can cause insufficiency of psychomotor skills in medical students. To solve this problem, virtual laboratory learning (VLL) has been developed to contribute laboratory practices through online learning.

## Objectives

To improve laboratory training experience and motivate learning of LI-CBL in an infectious disease course for medical students.

## Material and Methods

- VLL was achieved via 3 platforms



- The satisfaction survey was performed via questionnaire and focus group discussion.



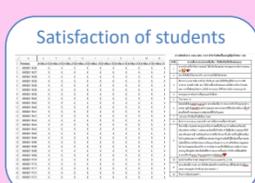
- The questionnaire was conducted for 94 medical students.



- The medical students were assigned into each focus group (12 persons/group) based on summative scores to be interviewed by non-influencer.



- The level of medical student satisfaction was analyzed.



## Results

- 78 out of 94 students responses questionnaire with response rate of 83%.
- Overall satisfaction among students was 99.2%.
- The student satisfaction revealed a mean score in all items of 4.75±0.4 out of 5.
- 65.2% (60/92) of participants in focus group revealed 3 key benefits of virtual laboratory learning including;
  - Enhancement of realistic
  - Increase understanding
  - Improvement of learning in laboratory processes
- Live-streaming is mostly suggested to incorporate into virtual laboratory due to key benefits including;
  - Configurable
  - Interactive
  - Just-in-time questions

Table 1: Medical student satisfaction

Items	M	SD	SD/D % (n)	N % (n)	SA/A % (n)
Stimulating on lab learning	4.8	0.4	0 (0)	0 (0)	100(78)
Interesting and exciting	4.7	0.4	0 (0)	1.3(1)	98.7(77)
Suitable for learning time	4.7	0.5	0 (0)	1.3(2)	97.4(76)
More convenience for learning	4.7	0.4	0 (0)	0 (0)	100(78)
Creates interrelationships between students and teachers	4.8	0.4	0 (0)	0 (0)	100(78)
Properly for lab learning	4.8	0.4	0 (0)	1.3(1)	98.7(77)
Provides cognition in content of lab learning	4.8	0.3	0 (0)	0 (0)	100(78)
Enjoy learning	4.7	0.4	0 (0)	0 (0)	100(78)
Useful for lab learning	4.8	0.4	0 (0)	1.3(1)	98.7(77)
Deserve to be continued	4.7	0.4	0 (0)	1.3(1)	98.7(77)

SD:strongly disagree D: disagree N:neutral A: agree SA: strongly agree

## Discussion

In this study, VLL with 3 platforms is incorporated into LI-CBL of the infectious disease course during COVID-19 pandemic. Then, we measured and reported medical student satisfaction of VLL. Based on our data, the medical students were satisfied with the VLL. VLL provides opportunities to improve learning and enhances student experiences for laboratory practices<sup>1</sup> especially when live-streaming is incorporated with VLL. Unlike pre-recorded material, live-streaming revealed the advantages including interaction and collaboration equally with on-site learning.<sup>2</sup> However, hand-on laboratory practices seem to be required for medical students.<sup>3</sup> Our findings could be could be beneficial for designing and delivering online learning activities to increase student satisfaction and subsequently results in the quality of learning.

## Conclusion

Although, hand-on laboratory practices are a necessary part to develop student psychomotor skills. During COVID-19, VLL help to improves teaching quality and enhances medical students for learning and understanding in laboratory practices.

## References

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