

# Preservice Teachers' Resilience, Stress, and Technology Efficacy Under the COVID-19 Influences: A Case Study in Taiwan

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## Background & Literature Review

The Coronavirus disease 2019 (COVID-19) unexpected outbreak resulted in a rapid migration of face-to-face in-class teaching and learning to online and distance educational methods internationally. This change created challenges on preservice teachers' **ICT technology application skills, media literacy skills, information skills** (Eickelmann & Gerick; 2020; Hartshorn et al., 2021), and **mental health** (Roman, 2020).

## Research Purpose & Hypothesis

Although students in Taiwan remained in face-to-face in-classroom learning mode, they however also prepared to move the class to the internet and learned how to teach on the Internet. Therefore, **this study aimed to investigate the relationship among preservice teachers' technology efficacy, resilience, and stress. Following hypothesis were tested:**

- H<sub>1</sub>: Technology for academic learning is associated with course design.
- H<sub>2</sub>: Technology for internet searching is associated with course design.
- H<sub>3</sub>: Resilience is associated with academic learning and course design.
- H<sub>4</sub>: Academic stress is associated with internet searching and course design.

## Results

**1. The path model for the low-tech use for course design**  
 $\chi^2 (N = 113, df = 1) = .282, p = .595, GFI = .999, AGFI = .985, RMR = .006, SRMR = .0128, RMSEA = .000, NFI = .997, RFI = .974, IFI = 1, CFI = 1$ . The results indicated this is a good model.

**2. The path model for the adv-tech use for interactive course design**  
 $\chi^2 (N = 113, df = 1) = .282, p = .595, GFI = .999, AGFI = .985, RMR = .006, SRMR = .0128; RMSEA = .000, NFI = .997, RFI = .971, IFI = 1, CFI = 1$ . The results indicated this is a good model.

**3. Indirect relationships (see Table 3)**

- There is a statistically significant indirect effect of technology efficacy for academic learning on resilience of problem solving.
- There is a statistically significant indirect effect of future stress on advanced technology use for interactive course design.

**Table 3**  
The significant of indirect effects for the model.

Factors relations	Lower bounds	Upper bounds	p
Adv-tech use for interactive course design ← Academic Learning	.028	.337	.008**
Adv-tech use for interactive course design ← Stress for future	-.246	-.044	.001**

Therefore, we accepted

H<sub>1</sub>= technology for academic learning is associated with course design.

H<sub>2</sub>= technology for internet searching is associated with course design.

H<sub>3</sub>= resilience is associated with academic learning and course design.

and rejected

H<sub>4</sub>= academic stress is associated with internet searching and course.

## Acknowledgments

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## Methods

### Participants

- A purposive sampling method was used for participant recruitment. Students were recruited from universities that provide teacher education programs through contacting teachers who were teaching in the programs. All participants (N=113) received 50NT 7-11 gift card (about 1.5 U.S. dollars)

**Instruments** (details see Table 1 & 2):

- The preservice teachers' Inventory of Technology Efficacy (ITE)
- The preservice teachers' Inventory of Technology use efficacy for Course Design (ITE-CD)
- The preservice teachers' Inventory of Resilience (IoR) – Problem solving section
- The preservice teachers' Inventory of Academic Stress (AS) – Concerns for future section

### Research design and procedures:

- All data were collected through SurveyCake
- Resampling with the bootstrap by 1000 with the upper and lower bounds for the confidence interval at 95%.

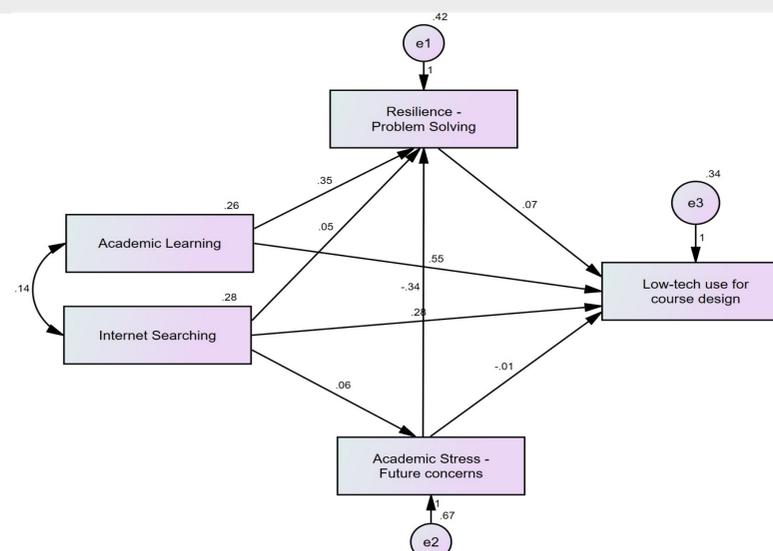


Figure 1: The path model of how technology efficacy, resilience, and stress affect low-tech use for course design

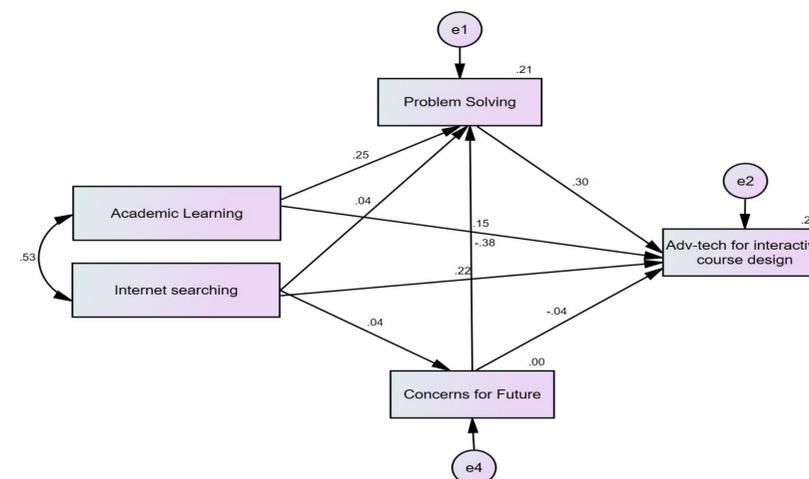


Figure 2: The path model of how technology efficacy, resilience, and stress affect advanced technology use for interactive course design

Table 1

The Cronbach's  $\alpha$ , reliability, and EFA factor loadings of ITE & ITE-CD

Factors	Items	EFA Loadings		Corrected item-total correlation	Squired multiple correlation
		1	2		
<b>ITE (<math>\alpha = .868</math>)</b>					
Academic Learning	TL 1	.754		.612	.450
	TL 3	.775		.672	.520
	TL 5	.574		.643	.447
	TL 7	.540		.687	.484
Online searching for teaching related resources	TL 8		.809	.602	.419
	TL 9		.630	.664	.460
	TL 10		.722	.628	.420
<b>ITE-CD (<math>\alpha = .862</math>)</b>					
Low tech use for course design	Tefac 3	.769		.666	.838
	Tefac 4	.789		.657	.838
	Tefac 6	.745		.515	.858
Adv- tech use for interactive course design	Tefac 2		.849	.716	.827
	Tefac 5		.646	.552	.842
	Tefac 7		.847	.716	.827

Table 2: The Cronbach's  $\alpha$ , reliability, and EFA factor loadings of the IoR – problem solving & AS – Concerns for Future

Factors		EFA loadings		Corrected item-total correlation	Squired multiple correlation
		1	2		
Problem Solving ( $\alpha = .80$ )	Res 2	.849		.652	.476
	Res 3	.813		.680	.517
	Res 10	.553		.675	.470
Concerns for future ( $\alpha = .75$ )	Future 2		.892	.892	.707
	Future 3		.806	.806	.554
	Future 6		.712	.712	.420

## Discussion and Conclusion

### 1. Online searching, resilience, and adv-tech for course design

Our findings suggested that

- ❖ The **resilience** and **online searching** played an important role on supporting the use of **advanced technology for interactive course design**.
- ❖ The challenge of applying advanced technology for teaching is greater than just learning it.
- ❖ The current practice as school does NOT satisfied to the need of using advanced technology for interactive course design.
- ❖ Supported previous study that preservice teachers tent to acquire supports from the internet during the pandemic due to school support is not sufficient (Bower, DeWitt & Lai, 2020).

### 2. information, media, and technology skills, stress, and resilience

Our findings indicated that

- ❖ The preservice teachers' **information, media, and technology skills** are **directly** associated with **resilience** and **indirectly** associated with **future stress** on their post pandemic career preparation.
- ❖ Supported Eickelmann & Gerick (2020) and Hartshorn et al.'s, (2021) studies on **preservice teacher's ICT skills, media literacy skills, and digital skills** are critical for their current learning and the post-pandemic education and career preparation.

### 3. Preservice teachers have more confidence on use low-tech for course design

Our findings suggested that

- ❖ Preservice teachers have more confidence on using low-tech to design lecture course for lower level cognitive domain learning.
- ❖ Supported previous studies that preservice teachers considered the use of **Kahoot!** as a low-tech use as PowerPoint (Wang, 2015| Licorish et al., 2018).