

Title: Student Adaptability to Online Learning

Introduction:

Online education has been around for several years, but became mandatory in many countries during the height of the COVID-19 pandemic. This sudden transition was difficult for everyone, and some students were better at adapting to the online format. Many factors may have contributed to this variability in adaptability, including, age, school type, gender, etc.

Several studies have been done on COVID-19 and online learning, particularly in relation to public (government) vs private (non-government) schools. One study found that private school teachers adapted better to online teaching and tried harder to adapt to the situation than public school teachers (Koç & Fidan, 2022). Another study conducted pre-COVID also found differences in adaptability to online learning, particularly dependent on the environments that students were in on and off campus (Xie, Lin, & Zhang, 2010).

In this project, we will attempt to answer the question: is adaptability to online school independent of school type? To explore this question, we will look at the mean proportion of students that are adaptable in government and non-government schools (location parameter) . We will also look at standard deviation of adaptability within government vs non-government schools to assess if there is a greater variability in adaptability for one of the groups (scale parameter).

We'll use the dataset "Students Adaptability Level in Online Education", which has the adaptivity level as well as several other variables such as education level, institution type, location, financial condition, etc (Suzan et al., 2021). The variables we will be using are adaptability and institution type.

Null: \hat{p} students adaptable in private schools = \hat{p} students adaptable in public schools

Alternate: \hat{p} students adaptable in private schools \neq \hat{p} students adaptable in public schools
there's higher standard deviation in adaptability for students in public schools

Preliminary Results:

Methods (Plan) (*Combination version*):

The report thus far has served to explore and illustrate the data as given, and isolate the variables of interest. The proportion and total count of the different adaptability measures with respect to institution type are clearly visible, and this would serve well to simply see the difference in proportion.

This being said, we have not yet explored the idea of the variable of interest (institution type) and its binary options being *confounded* or *dependent*. As such, we believe that an independence hypothesis test is necessary. We will begin with combining the proportions of the middle and high adaptivity levels, and we will conduct the rest of the independence test with two adaptivity categories: low, and mid-high. We will make:

H_0 : \hat{p} students with mid-high adaptivity in private schools = \hat{p} with mid-high adaptivity in public schools

H_A : \hat{p} students with mid-high adaptivity in private schools \neq \hat{p} with mid-high adaptivity in public schools

We will test the difference in proportions for the different adaptability types to discern independence, and through bootstrapping, we will build a confidence interval for the difference in proportions.

We expect to find that both Government and Privately owned institutions are independent of each other when considering adaptability to online learning, which could provide a good basis and justification for a widespread formal online learning spaces as a part of regular schooling, or perhaps justification for setting up infrastructure to facilitate extra learning in an online setting in order to improve access to learning materials and resources.

Methods (Plan) (*Chi-Square version*):

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This being said, we have not yet explored the idea of the variable of interest (institution type) and its binary options being *confounded* or *dependent*. As such, we believe that an independence hypothesis test is necessary. We will make:

H_0 : The two categories of institution type are independent

H_A : The two categories of institution type are not independent

We will then conduct a Chi-Square test at the 5% significance level, compare it to the critical value from the Chi-Square table, and discern whether or not we should reject the null.

Through bootstrapping or other methods, we will build a confidence interval for the independence of the two categories in question.

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References:

Xie, X., Lin, F., & Zhang, T. (2001). Comparison between on- and off-campus behaviour and adaptability in online learning: a case from China. *Behaviour & Information Technology*, 20(4), 281–291. <https://doi.org/10.1080/01449290110083594>

Koç, M. H., & Fidan, T. (2022). The Comparison of the Adaptation of Public and Private School Teachers to Distance Education during the COVID19 Pandemic. *International and Multidisciplinary Journal of Social Sciences*, 11(1), 27–53. <https://doi.org/10.17583/rimcis.8000>

Original paper-

Suzan, Md. Mahmudul & Samrin, Nishat & Biswas, Al Amin & Pramanik, Md. (2021). Students' Adaptability Level Prediction in Online Education using Machine Learning Approaches. 1-7. 10.1109/ICCCNT51525.2021.9579741.