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The Application of Inclusion-Exclusion in the Collection of Face-to-face Learning Readiness in the Era of Pandemic

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Abstract: Face-to-face learning in the COVID-19 pandemic which results in learning activities will be carried out according to the law from government policy, as a result, students are required to vaccinate before face-to-face learning takes place. This study aims to make students able to learn face-to-face using government policy rules and maintain health to break the chain of the covid-19 pandemic, the research method used in this research is descriptive observational using a cross sectional design. The sampling technique used was 67 students who met the inclusion and exclusion criteria by using a questionnaire. The results of the respondent's level using the category of never being sick with COVID-19 of 92.5%, this result is higher than using the category of being exposed to Covid-19, which is only 7.5%. the conclusion of this study is that students have good health to participate in face-to-face learning, there is no relationship between gender, achievement index, but there is a very significant correlation with the area where students live.

Keywords: inclusion-exclusion, face-to-face learning, covid- 19

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INTRODUCTION

The expansion of the idea in the Venn diagram along with the operation of Slice and Join is called the Principle of Inclusion and Exclusion, but in this introduction the concept will be expanded and enriched with illustrations of various applications in combinatorial mathematics taken from student voices to determine face-to-face learning readiness.

In connection with the COVID-19 pandemic which was declared in March 2020 as an effort to limit the spread of the acute respiratory syndrome coronavirus two server virus, there were changes in daily activities and health service prizes. To reduce the spread of the virus, including school closures, it was also carried out to limit the spread of the virus on March 2, 2020, the first cases of Covid-19 were detected in Indonesia as of May 8, 12,276 cases and 930 deaths had been reported in 34 provinces. In the absence of recommendations for

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treatment or vaccines, Indonesia and other countries rely on physical distancing to slow the spread of the virus. The interventions implemented in Indonesia include: quarantine of people suspected of being infected, restrictions on domestic and international travel, bans on group and crowd gatherings and the closure of schools, factories, restaurants, and public spaces from (UNICEF, 2020).

LITERATURE REVIEW

Generally the best way to learn is in school. The school works significantly for families. Face-to-face learning in school is so good, why? Because schools not only teach academics but from the social aspect, emotional abilities, exercise and access to mental health and opportunities to do physical activity (Christakis, Van Cleve, & Zimmerman, 2020) this needs cooperation with public health officials so that the spread of the virus in the community becomes stable schools can be opened.

There are six policies that have been presented by the Minister of Education and Culture, Nadiem Anwar Makarim related to learning activities during the covid-19 pandemic. Because of this policy, inevitably the people of Indonesia must change their habits, especially to students, especially students.[1][2]

The learning model is one of the important factors that determine the ability of educational goals [3][4]. Learning methods are used as a support for students in understanding the subjects. Learning models exist that are electronic and non-electronic. Electronic learning models are widely used these days. Various digital platforms or applications become important in the learning process.[5][6][7][8].

Online learning is "in-network" learning as a translation of the term online which means connected to an online learning computer network. This method is widely used after the face-to-face learning policy was dismissed as cases of covid-19 increased. Many of the impacts that arise from this onlne learning, including: Students or students become passive, lack understanding of the concept of the material given, and many other impacts.[9][10][11].

Online lectures or also can be called E-learning is an abbreviation of electronic learning, which is a learning process that utilizes the internet as a method of delivery, interaction and facilitation, which also has the support of learning services utilized by learning participants. E-learning colleges have been booming lately due to a pandemic that occurred since about two years ago. E-learning methods are used to facilitate the learning process. Many use these methods, ranging from students or students to teachers and lecturers [12]. Negatively, on the other hand e-learning is understood as a less effective learning model because it does not occur face-to-face, especially for exact courses[13]. This is influenced by the learning style of each student, as well as the direct interaction that occurs between students and lecturers that is reduced causing understanding of each student's material is different and even tends to decrease.

However, there are major challenges in the implementation of distance learning models. That is financial limitations, especially in the outer regions of Indonesia. Initially, they apply face-to-face learning, but because of pandemic conditions like this, they also simultaneously conduct online or online learning. Many challenges must be faced, such as difficult signals, quotas used too much, gadgets that must be used by two uses with other family members, and many other factors.[14][15].

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Consciously, we know that the management of human resources is a core part in an association or shade of educational institutions. Almost two years ago, the pandemic hit. Make students and teachers or lecturers do not interact with each other directly. Therefore, an important component in this HR is teachers, students, and major actors related to education. The goal of HR management is to improve learning strategies during pandemic times.[16].

Schools face-to-face during the COVID-19 pandemic need adequate resources. Then, it must also be ready in supporting facilities to suppress spikes during face-to-face learning. Things to do include: check the temperature of students when entering school or campus, wash your hands, use hand sanitizer,and wear a mask. Setting the distance while in the classroom is also one of the efforts to prevent the spread of Covid-19 [17].

The development of increasingly widespread technology makes face-to-face (face-to-face) decreased attractiveness. Some feel face-to-face learning is no longer effective and makes you bored quickly. Others want face-to-face learning. When learning online, students or teachers are required to master different types of technology. It presents its own challenges. For those who are happy with computing, it actually makes it more interesting to explore and study computer science. Gadget addiction that has been happening, gives rise to interesting applications that attract the attention of the public. But unfortunately, this technology is still not widely used by lecturers and students.[18]

Each individual has a different coping in solving all the problems he experienced. There are students who remain passionate in learning during this pandemic, some are mid-term, some are experiencing a decrease or decrease in motivation in learning. That is, inseparable from the condition of the student, both physical and mental, family condition and also the environment[19].

Previous studies taken by the authors were the application of inclusion and exclusion principles[20]. This activity is carried out to obtain the characteristics of a population at a certain time. In its implementation, the population census uses two stages, namely complete enumeration and sample enumeration. More complete information is gathered in sample enumeration.

Indonesia conducts a population census once in ten years, and the 7th census has been conducted in 2020. The head of the Central Bureau of Statistics (BPS) in Beritasatu.com stated that there is a fundamental difference in census methods in 2020 called combination methods compared to previous methods. Some of the stages in this combination method can be seen on the BPS page. From the data we associate with the Implementation of Exclusion Inclusion in The Face-to-Face Learning Readiness Collection in the Era of the Covid-19 Pandemic by using an alternative that is google form shared with IAIN student Sheikh Nurjati Cirebon. In combinatoric theory how to calculate the elements of a combination of overlapping sets can be used the Principle of Inclusion-Exclusion.

METHODS

The Inclusion-Exclusion Principle can be used to calculate the number of elements of overlapping sets combined. This principle is generally more efficiently applied to sets with great cardinality. Data on the population of a country, especially Indonesia according to SP2010, is already above two hundred million people so that the Principle of Inclusion-Exclusion is the right method to use.[20]

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Theorem 2.1 Inclusion-Exclusion Principle

Suppose A1, ..., An is the set up. So the number of elements in the combination of A1 ∪ ... ∪ An is

$$|U_{i=1}^{n} A_i| = \sum I_{\subseteq\{1,\dots,n\} I\neq\emptyset}(-1)^{|I|+1}|\cap_{i\in I} A_i| \quad (1)$$

Proff: By Mathematical Induction,

For n =2, $|A_1 \cup A_2| = |A_1| + |A_2| - |A_1 \cap A_2|$

Next from the fact that $A_1 \cup A_2$ is a combination of gabugan from the set that often comes off A_1 and $A_2 \backslash (A_1 \cap A_2)$ and A_2 is joining from a set of sets that are separated from each other $A_2 \backslash\ (A_1 \cap A_2)$ and $A_1 \cap A_2$. The equation is obtained;

$$|A_2| = A_2 \backslash (A_1 \cap A_2)| + |A_1 \cap A_2|$$

$|A_1 \cup A_2| = |A_1| + A_2 \backslash (A_1 \cap A_2)|$.

The next stage of induction, suppose the question is correct for $n = n - 1$ set. Then it will be shown that the statement is also true for n set.

$$\left|\bigcup_{i=1}^{n} A_i\right| = \left|\bigcup_{i=1}^{n} A_i \cup A_n\right| = \left|\left(\bigcup_{i=1}^{n-1} A_i\right) \cap A_n\right|$$

$$= \left|\left|\cup_{i=1}^{n-1} A_1\right| + |A_1| - \left|\cup_{i=1}^{n-1} (A_1 \cap A_n)\right|\right|$$

$$= \sum\nolimits_{I\subseteq\{1,\dots,n-1\} I\neq\emptyset} (-1)^{|I|+1}|\cap_{i\in I} A_i| + |A_n| - \sum_{I\subseteq\{1,\dots,n-1\} I\neq\emptyset} \left|\bigcap_{i\in I}(A_1 \cap A_n)\right|$$

By grouping the numbers that have the same number of fakotr in the slices, it is obtained as the equation(1),

$$\left|\bigcup_{i=1}^{n} A_i\right| = \sum\nolimits_{I\subseteq\{1,\dots,n\} I\neq\emptyset} (-1)^{|I|+1} \left|\bigcap_{i\in I} A_i\right|$$

Theorem 2.2

Suppose A1..., An is the subsets up to the S collection, and suppose

$\overline{A_1} = S - A_i$ It is the complement of A_i. So

$$|\cap_{i=1}^{n} \overline{A_1}| = |S| + \sum\nolimits_{I\subseteq\{1,\dots,n\} I\neq\emptyset} (-1)^{|I|} |\cap_{i\in I} A_i| \quad (2)$$

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RESULT AND DISCUSSION

Effectiveness for face-to-face learning is required vaccination efforts to break the chain of transmission of covid-19. According to the Current Health Office, the covid-19 vaccine is being distributed throughout the indonesian community. The provision of this vaccine is the most appropriate solution to reduce the number of cases of SARS-CoV-2 virus infection that causes covid 19 disease. This vaccine is very important to protect the public from covid-19, vaccination or immunization aims to make a person's immune system able to recognize and quickly fight bacteria or viruses that cause infection.

The goal to be achieved by giving the covid 19 vaccine is to reduce the number of pain and death rates due to this virus. People who are not recommended to receive the vaccine or not become a priority for the covid-19 vaccine include children or adolescents under the age of 18 years and people who suffer from certain diseases such as diabetes or uncontrolled hypertension.

Seen and can be observed this study was taken from a questionnaire by IAIN Student Sheikh Nurjati Cirebon as many as 67 students who have been vaccinated covid dose 1, covid vaccine dose 2 and who have not been vaccinated, this information is to prepare for face-to-face or offline learning. Here are the results of the questionnaire we got from IAIN Student Sheikh Nurjati Cirebon.

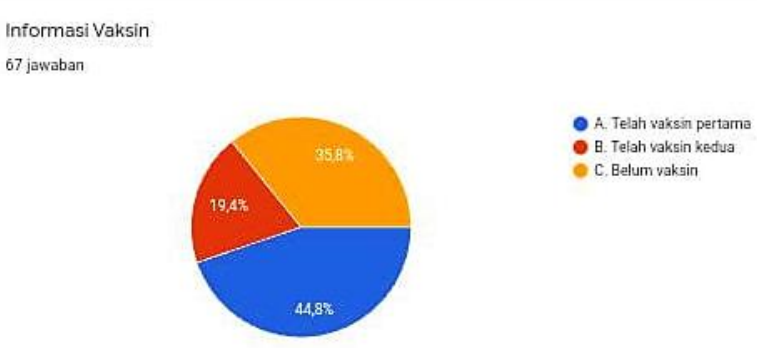

Figure 1: Use of Datasets in Face-to-Face Research

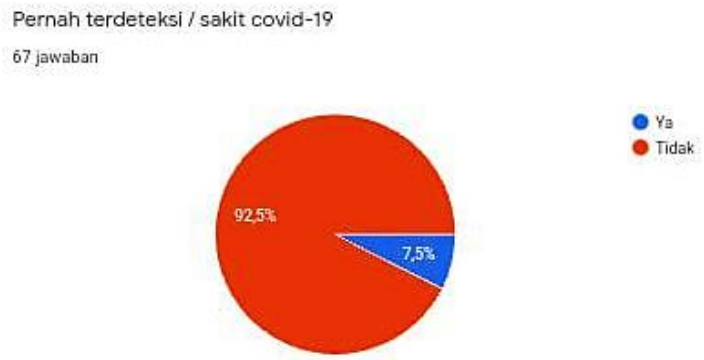

Figure 2: Use of Datasets in Covid-19 research

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After going through the data from the questionnaire can be expressed in set form and presented in the venn diagram as follows:

A1 = exposed, A2 = un exposed

A = $A_1 \cup A_2$ (data exposed and not exposed to covid-19)

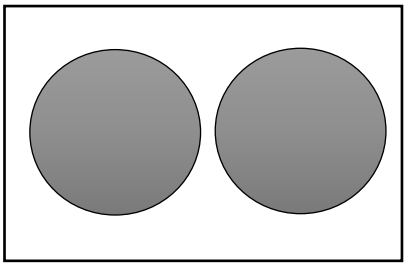

Figure 3: data exposed and not exposed to covid-19

According to the data above the principle of inclusion and exclusion of face-to-face learning readiness with data, many are not exposed to covid-19. Use the equation (1). Observed I ={1,2}. Sub-set of I except ∅ is {1}.{2}, and {1.2}, so

$$|U_{i=1}^{n} A_i| = \sum I_{\subseteq\{1,2\} I \neq \emptyset} (-1)^{|I|+1} |\cap_{i \in I} A_i|$$

$$|A_1 \cup A_2| = |A_1| + |A_2| - |A_1 \cap A_2|$$

Example:

Suppose after the end the data is exposed and not exposed as follows:

| A1| = 5, | A2| = 62, | A1 ∩ A2| = 0. The venn diagram image is mutually free, so by substituting its values to the seed (3) obtained $|A_1 \cup A_2| = 5 + 62 - 0 = 67$.

From the data above with the result of 67 votes using the equation (3).

CONCLUSION

Schools face-to-face during the COVID-19 pandemic need adequate resources. Then, it must also be ready in supporting facilities to suppress spikes during face-to-face learning. Things to do include: check the temperature of students when entering school or campus, wash your hands, use hand sanitizer, and wear a mask. Setting the distance while in the classroom is also one of the efforts to prevent the spread of Covid-19. The development of technology that is increasingly widespread makes face-to-face experience a decrease in attractiveness. Some feel face-to-face learning is no longer effective and makes you bored quickly. Others want face-to-face learning. When learning online, students or teachers are required to master different types of technology. It presents its own challenges. For those who are happy with computing, it actually makes it more interesting to explore and study computer science. Gadget addiction that has been happening, gives rise to interesting applications that attract the

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attention of the public. But unfortunately, this technology is still not widely used by lecturers and students.

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