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From Online Learning to F2F: Learning Loss Still Remain or Even Learning Gain?

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Abstract: From Online Learning to F2F: Learning Loss Still Remain or Even Learning Gain. Objectives: On June 21, 2023, the government of Indonesia issued a presidential decree (No. 17 of 2023) declaring the end of the country's outbreak of Covid-19. The restricted involvement in the educational process throughout the three-year period of the pandemic has led to considerable concerns regarding the existence of substantial academic deficiencies. The regulation signifies the conclusion of the pandemic's impact on online learning and the commencement of a return to traditional, in-person instruction. The objective of this study is to ascertain whether there has been a continued decline in academic performance or an improvement in learning outcomes since the pandemic **Methods:** The data were subjected to statistical analysis using regression and difference-in-differences techniques. This study was conducted with 720 high school students in Jakarta starting from the second wave of the pandemic in Indonesia and the first post-pandemic F2F period. **Findings:** The post-pandemic implementation of F2F demonstrated an improvement in learning outcomes across all three LS. However, the post-pandemic F2F transition also revealed unexpected contradiction in a small group of students. **Conclusion:** This highlights the need for further attention from educators and policymakers.

Keywords: face to face learning, learning loss, learning gain, student learning styles, quality education.

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INTRODUCTION

On June 21, 2023, the President of the Republic of Indonesia, through Presidential Decree 17 of 2023, formally declared the conclusion of the Corona Virus Disease 2019 (Covid-19) pandemic in Indonesia. The regulation states that this decision was issued subsequent to a comprehensive scientific assessment by the government indicating a notable decline in the prevalence and severity of cases of SARS-CoV-2 infection in Indonesia. Furthermore, the assessment also considered the country's robust public health resilience to the outbreak and the extensive implementation of vaccination programs across all regions (Keppres, 2023). The issuance of this regulation marks a pivotal moment in the normalization of all forms of community activities, with the lifting of restrictions on interaction.

The presidential decree served to reinforce the global consensus that educational institutions should adapt their pedagogical approach. The considerable public pressure that has been exerted since the onset of the pandemic to resume the learning process to its pre-pandemic state has been met with success. The limited face-to-face

learning trials, which experienced both successes and challenges, were conducted by the government and generated controversy within the community during the pandemic. Consequently, the Presidential Decree mandated the comprehensive implementation of F2F in all Indonesian provinces. However, the return to a normal learning process presents a significant challenge: how to optimise the competencies of children who studied during the pandemic, given the limitations of the period. The first step is to analyse the achievement of learning competencies and ascertain whether learning loss occurred during the pandemic, and if so, to determine the extent of the impact.

A substantial body of research has demonstrated that the prolonged duration of the covid-19 pandemic resulted in a significant decline in academic performance. The cause is not solely attributable to a single factor, but rather a confluence of factors. Additionally, there was a lack of preparation and foresight in anticipating the rapid and widespread impact of the covid-19 outbreak. From difficulties in accessing learning materials to the closure of educational institutions during the pandemic, the resulting learning delays have been particularly pronounced among students from underprivileged backgrounds and those with parents who have received limited education (Schuurman et al., 2023). Households with a stable economic situation are better equipped to cope with the disruption to their children's education caused by the pandemic (Monroy-Gómez-Franco et al., 2022). In addition to the influence of family income, students' engagement in online learning is constrained by a dearth of requisite resources, including smartphones, internet access, and computers. Furthermore, the limitations of teaching methods must be considered. Some subjects are more challenging to teach via distance learning than others, and the learning environment at home is often inadequate. For instance, children may lack their own dedicated space, the household may be too large for one room, and noise levels during online learning sessions may be a distraction. Additionally, parental motivation to assist with online learning at home may be lacking (Haser et al., 2022). With respect to the student cohort, those who had been inclined to procrastinate with regard to online learning during the period of the pandemic reported no diminution in their grade scores. However, students who had not been prone to such procrastination demonstrated an improvement in their grades, which were superior to those achieved prior to the pandemic. Moreover, other variables, such as enthusiasm for learning, engagement with online learning, and the absence of self-regulation during the pandemic, are also believed to influence students' academic performance during this period (Melgaard et al., 2021). Additionally, some students were reluctant to solicit assistance from their instructors during virtual learning due to concerns about being ridiculed by their peers. Consequently, they opted to seek guidance from their instructors via alternative channels. Additionally, some students were found to be assisting their parents with income generation, which resulted in fatigue and diminished motivation to learn (Suwathanpornkul et al., 2023). The phenomenon of burnout is not exclusive to students; teachers are also susceptible to experiencing it as a result of an increased workload, heightened expectations, and the necessity of correcting an ever-increasing number of student assignments within the context of online learning. Furthermore, the need to maintain communication with parents regarding their children's learning needs and issues at home adds another layer of stress (Perryman et al., 2024). The difficulty of teachers in identifying student responses through non-verbal cues, such as facial expressions, is a significant challenge in online learning. This difficulty in understanding the

material taught can lead to emotional issues between teachers, students, and parents, particularly when there is a perceived burden of bringing school to the home. These are complex and inevitable challenges during pandemic learning (Mifsud & Day, 2022).

Consequently, with regard to reading competency achievement, students exhibited a loss of between 57% and 70% of a year's worth of learning compared to their pre-pandemic counterparts (Ardington et al., 2021). The acquisition of reading skills is of greater consequence to students in grades 2 and 3 than to those in higher grades. This is due to the fact that students in the lower grades require more assistance in the practice of reading, whereas those in the higher grades are better able to develop reading skills without the input of their parents (Sandberg Patton & Reschly, 2013). The potential for learning loss is also evident from the fact that the majority of children (42.9%) and a significant proportion of children (21.5%) consistently seek assistance from family members due to difficulties in comprehending the curriculum at school. It is estimated that children lose, on average, approximately 20% of the knowledge acquired during the previous academic year (Sabates et al., 2021). In Brazil, it is documented that children exhibit a learning deficit of 0.23 and 0.25 standard deviations in language and mathematics, respectively. This is equivalent to 65% of the learning achieved by students when compared to the F2F and 48% of the learning achieved by students from low-income families under typical conditions (Bartholo et al., 2023) and the impact is influenced by a standard deviation of 0.37 to +0.25 (Hammerstein et al., 2021).

In the course of this research, we have identified learning styles as a significant concern, given their demonstrated impact on students' academic performance, both during and after the pandemic. Students with logical and visual learning style tendencies may demonstrate less difficulty with online learning during the pandemic. This is because this learning style employs logic and visuals, such as pictures, graphs, and videos, which are conducive to online learning. This learning style is also deemed conducive to the pandemic learning process, which places an emphasis on students' self-learning. Conversely, students with interpersonal and kinesthetic learning styles will encounter considerable challenges with online learning, as these learning styles necessitate direct interaction with teachers and peers. In other words, students with these types of learning styles find it challenging to learn independently.

The findings of Amponsah et al (2024) indicate a positive correlation between learning styles and academic performance. This conclusion is supported by other studies that have demonstrated a relationship between learning styles and learning outcomes, students' intellectual development, and career choices. (Götzfried et al., 2024; Nancekivell et al., 2020; Sun et al., 2023).

In addition to the learning style factor, this study is also considered important because there are few studies that discuss the transition of online learning to face-to-face (F2F) after the pandemic. F2F is often believed to be a solution to the learning loss that is frequently discussed during the pandemic. However, this assumption has not been empirically tested. On the contrary, there are numerous studies that discuss the transition from F2F to online learning caused by the pandemic.

Now, the pandemic has ended with so many upheavals and dilemmas. Approximately three years of the pandemic have been going on since March 11, 2020, the World Health Organization announced Covid-19 as an epidemic that hit the world, now schools have reopened. The learning process returns to the initial setting, namely F2F. Now the question is with the return of the learning process to F2F

after the pandemic, is there still learning loss? Has the F2F learning process succeeded in improving student skills that should have been mastered in the years before the pandemic came? Have students been able to get out of the shadow of the problems of distance learning that separates direct interaction between teachers and students. Questions around this are what will be studied through this research by analyzing 3 large groups of student learning styles, namely verbal, intrapersonal & interpersonal (VIIN) (b) logical & visual (LV) (c) logical visual & kinesthetic (LVK) groups.

METHOD

Research Design and Procedure

The research was conducted using regression model statistics, as well as difference-in-differences method by examining the Coefficients â and P-value to (a) analyze the estimated learning gain in the three categories of students' learning styles post-pandemic and measure the extent of the impact of face-to-face learning post-pandemic on learning gain, and (b) analyze the estimated learning gain and measure the extent of the impact of face-to-face learning post-pandemic on the six groups of students in each category of learning styles.

In assessing the potential learning loss caused by abnormal conditions various research methods were used. Several studies suggest that regression models can be used to predict learning loss at the school level (Bertoletti et al., 2023), predicting how much time parents spend while their children are studying at home during the pandemic and predicting how children's academics are disrupted due to online learning at home (Booth et al., 2021). In addition, learning loss can also be analyzed using a combination of two statistical approaches, namely linear regression models and a difference-in-differences approach (Birkelund & Karlson, 2023) or dividing the coefficient value by the standard error (t-value) and then calculating the p-value and matching it with the significance level (Schuurman et al., 2023). Learning loss can also be identified by measuring the difference in mean scores between two groups and calculating Cohen's d (Hevia et al., 2022) and also by looking at the standard deviation (Hallin et al., 2022). The regression model is also used for analyzing the estimated impact of children's age on their school participation during the pandemic (Khan & Ahmed, 2021).

Participants

The research was conducted on 720 students spread across several Senior High Schools in Jakarta. The respondents are grouped into 3 categories of student learning styles, each with 240 respondents, including verbal, intrapersonal & interpersonal (VIIN), logical & visual (LV), and logical, visual & kinesthetic (LVK). Each category of student learning style consists of 6 groups, each with 40 respondents. To obtain data on what is the dominant learning style of each respondent, a questionnaire was distributed.

Instrument

To ascertain the responses to the research questions, the principal instrument employed is student summative assessment data. As posited by Svensäter & Rohlin (2023) summative assessment outcomes represent a comprehensive representation of students' academic performance at the conclusion of the learning process, and serve to determine whether students have attained the established standards. Consequently, this assessment assumes a pivotal role with far-reaching implications (Yildirim et al., 2024).

Consequently, summative assessment furnishes evidence of each learning process (Fagerholm et al., 2024). Moreover, summative assessment can also be utilized as an indicator of

students' academic performance in learning between before and after, and is a holistic assessment represented in one grade (Erduran et al., 2021; Postmes et al., 2023).

In light of the aforementioned considerati ons, student final examination test scores in a number of subjects are employed as the principal instrument for gauging the extent of potential learning loss or learning gain subsequent to the pandemic.

Data Collection and Analysis

Data was obtained using a questionnaire and tests. Student scores during the pandemic were taken from the second semester of the 2021/2022 academic year, which took place around February 2022. This period was chosen considering that in February 2022, Indonesia experienced the peak of the second pandemic wave, specifically the omicron variant. Meanwhile, student scores after the pandemic were taken from the odd semester of the 2023/2024 academic year, which occurred around September 2023. During this period, Indonesia officially declared on June 21, 2023, through Presidential Decree 17 of 2023, that the status of the COVID-19 pandemic has transitioned to endemic.

The data analysis process is conducted in several stages, including the following: (a) the grouping of respondents according to their dominant learning styles; (b) the grouping of summative assessment data, which is divided into two types: namely, pandemic summative data and post-pandemic summative data; (c) the conducting of statistical data processing through regression models and difference-in-differences; and (d) the analysis and interpretation of the results of data processing.

RESULT AND DISCUSSION

Learning Gain Estimates Per Student Learning Style

This subsection wants to know the estimated learning gain of each student learning style cumulatively in groups 1-6 who participated in F2F post-pandemic and how significant the impact is. From the three categories of student learning styles, we also want to discuss which learning styles have high and low estimated increases. To obtain this information, the Coefficients B and p-value values are seen for each type of student learning style. The hypothesis is as follows:

HO: After participating in post-pandemic F2F, there was no significant increase in competency achievement in each student's learning style

H1: After participating in post-pandemic F2F, there was a significant increase in competency achievement in each student's learning style

Table 1. Lerning gain estimates Based on student learning styles

Coefficients	VIIN Group 1-6	LV Group 1-6	LVK Group 1-6
Unstandardized Coefficients			
B	3.919	7.629	5.625
Std. Error	0.938	1.308	0.988
Standardized Coefficients			
Beta	0.188	0.258	0.252
t	4.179	5.835	5.691
Sig.	0.000	0.000	0.000

Table 1 shows that the Coefficients B value for the three types of student learning styles is positive, consisting of VIIN LS (B=3.919), LV LS (B=7.629) and LVK LS (B=5.625). This shows that there is an increase in competency achievement after students take part in post-pandemic F2F. The highest level of learning gain estimates is in students with LV learning styles followed by students with LVK learning styles. While the lowest learning gain estimates are in the group of students with VIIN learning style characteristics. Then if you look at the p-value in table 1, it can be seen that 0.000 d" 0.05 so that HË% is rejected. This shows that F2F followed by students after the pandemic really has a significant impact on increasing student competency in both VIIN, LV and LVK learning styles.

Learning Gain Estimates Between Each Group of Each Student Learning Style

This subsection discusses the estimated learning gain of each group in each category of student learning styles and how significant the impact of F2F is on learning gain. Among groups 1-6, was there a significant increase in competency achievement after students returned to the F2F learning mode or on the contrary, was there a decrease in student competency achievement after the pandemic. The hypothesis is as follows:

HO: After participating in post-pandemic F2F, there was no significant increase in competency achievement between the experimental group and the control group for each type of student learning style.

H1: After participating in post-pandemic F2F, there was significant increase in competency achievement between the experimental group and the control group for each type of student learning style.

Based on table 2, it can be stated that 5 out of 6 groups of students with VIIN learning styles have positive Coefficients. This can be seen from group 1 (B = 8.250), group 2 (B = 5.025), group 3 (B = 8.415), group 4 (B = 2.792) and group 5 (B = 2.391). This shows that students in groups 1-5 with VIIN learning styles experienced an increase in competency achievement after undergoing F2F after the pandemic. The rest, group 6 has a negative Coefficients score (B = -3.358). This shows that there was no increase in student competency achievement in group 6 even though learning has returned to F2F after the pandemic. In addition, table 6 also shows that 3 out of 6 groups have a p-value d" 0.05 so that HË% is rejected. This shows that F2F has a significant impact on improving the competence of VIIN learning style students in groups 1, 2,

Table 2. Lerning gain estimates between each group of verbal, intrapersonal & interpersonal learning style

Coefficients	G-1	G-2	G-3	G-4	G-5	G-6
Unstandardized Coefficients						
B	8.250	5.025	8.415	2.792	2.391	-3.358
Std. Error	2.533	1.772	3.009	2.212	2.199	1.387
Standardized Coefficients						
Beta	0.346	0.306	0.302	0.142	0.122	-0.264
t	3.258	2.835	2.797	1.263	1.088	-2.421
Sig.	0.002	0.006	0.006	0.211	0.280	0.018

and 3. Specifically in group 6, the p-value d" 0.05, but this shows that it is statistically proven that in group 6 VIIN there was a significant decrease in student competency achievement after the pandemic even though students had returned to learning with the F2F learning mode. Meanwhile, in groups 4 and 5, the p-value> 0.05 was seen so that HË% was accepted, which means that although there was an increase in competency achievement after F2F was implemented if you look at Coefficients B, but if you look at the p-value, F2F did not have a significant impact on improving student competency in group 5.

Table 3. Lerning gain estimates between each group of logical & visual learning style

Coefficients	**G-1**	**G-2**	**G-3**	**G-4**	**G-5**	**G-6**
Unstandardized Coefficients						
B	0.575	14.175	11.175	13.825	1.375	4.650
Std. Error	2.965	3.530	3.794	2.291	2.010	0.958
Standardized Coefficients						
Beta	0.022	0.414	0.316	0.564	0.077	0.482
t	0.194	4.016	2.946	6.033	0.684	4.855
Sig.	0.847	0.000	0.004	0.000	0.496	0.000

Based on table 3, it can be stated that all groups of students with LV learning styles have positive Coefficients. This can be seen from group 1 (B = 0.575), group 2 (B = 14.175), group 3 (B = 11.175), group 4 (B = 13.825), group 5 (B = 1.375) and group 6 (B = 4.650). This shows that students in groups 1-6 with LV learning styles experienced an increase in competency achievement after undergoing F2F after the pandemic. In addition, F2F followed by students after the pandemic had a significant impact on groups 2,3,4 and 6. This can be seen from the p-value d" 0.05 in the 4 groups so that HË% is rejected. While in groups 1 and 5 have p-values> 0.05 so that HË% is accepted. This shows that post-pandemic F2F did not have a major impact on improving student competency in groups 1 and 5 F2F even though there was an increase in the score on Coefficients B.

Table 4. Lerning gain estimates between each group of logical, visual & kinesthetic learning style

Coefficients	**G-1**	**G-2**	**G-3**	**G-4**	**G-5**	**G-6**
Unstandardized Coefficients						
B	4.300	9.500	6.725	10.300	3.850	-0.925
Std. Error	2.362	1.960	2.308	1.284	3.282	2.421
Standardized Coefficients						
Beta	0.202	0.481	0.313	0.672	0.132	-0.043
t	1.820	4.848	2.913	8.024	1.173	-0.382
Sig.	0.073	0.000	0.005	0.000	0.244	0.703

Based on table 4, it can be stated that 5 out of 6 groups of students with LVK learning styles have positive Coefficients. This can be seen from group 1 (B = 4,300), group 2 (B = 9,500), group 3 (B = 6,725), group 4 (B = 10,300) and group 5 (B = 3,850). This shows that students in groups 1-5 with LVK learning styles experienced an increase in competency achievement after undergoing F2F after the pandemic. The rest, group 6 has a negative Coefficients score (B = -0.925). This shows that there was no increase in student competency achievement in group 6 even though students with LVK learning styles had studied with F2F mode. In addition, it can also be stated that F2F had a major impact on increasing student competency after the pandemic occurred in groups 2,3 and 4 by looking at the p-value d" 0.05. Thus, HË% is rejected. However, in groups 1 and 5 the p-value > 0.05 so that HË% is accepted. This illustrates that post-pandemic F2F has no major impact on improving student competency in these 2 groups. Meanwhile, in group 6 the p-value > 0.05 so that HË% is accepted. However, this can be interpreted that statistically the decline in student competency was not significant in group 6 and also does not provide strong enough evidence that the post-pandemic F2F mode had a significant impact on decreasing student competency.

The above findings reveal a number of interesting facts that warrant further investigation. This study presents a scientific fact that the efforts of post-pandemic education stakeholders to reduce learning loss that occurred during the pandemic were considered successful as stated in table 1 for both students with VIIN or LV or LVK learning style tendencies. The difference in competency achievement obtained by students after the pandemic is reinforced by the estimated significant increase in competency achievement for students with positive Coefficients B in the three types of learning styles and is reinforced again by the Sig. value. which statistically means that post-pandemic F2F really has a big influence on increasing student competency achievement (table 5). Concerns such as whether learning loss will continue when the pandemic is over or whether students can return to learning with high determination after the pandemic because they are too comfortable at home are refuted. The reopening of schools opens up new hopes for students to gain learning experiences without the constraints of space, internet connection or device limitations that are commonly experienced during the pandemic.

Online learning during the pandemic has left many lessons. The pandemic did not give a signal to prepare in advance. School closures are the main cause of learning loss, so it is necessary to develop an education strategy that can restore learning loss, one of which is returning to F2F learning and then evaluating the extent of the impact given (Kuzmanic & Valenzuela, 2024). It is very well known that online learning that dominates during the pandemic on the one hand makes it difficult for students to get to know each other and concentration is easily lost when learning via zoom. However, based on research Karlsen et al (2023) students expect that in the future teachers will still be skilled and accustomed to using digital learning that is integrated with an active learning environment. This is particularly the case when confronted with uncertain, complex and ambiguous learning conditions (Hapsari & Emilia, 2024). Thus creating flexibility for students in learning. In the context of online learning continuity, the majority of teachers welcomed it positively based on seeing students' participation in learning through LMS. Although there are things that need to be underlined and special attention, namely student honesty when doing online assignments or exams (Haryati et al., 2021).

Giday & Perumal (2024) online learning reminds us of the importance of quality materials listed on digital platforms because this factor is

key to student satisfaction, engagement and motivation to learn. In addition, user perceptions of ease of use and usefulness of digital learning are also factors that influence the benefits received (Alyoussef, 2023). Student skills in the use of technology, satisfaction and motivation and self-regulated learning are also integral to the success of e-learning (Sutarni et al., 2021; Wagiran et al., 2022). In addition, training, time management and independence in using technology also contribute to the success of distance education and student performance (Alzahrani, 2022; Hafeez et al., 2022).

This study, in addition to providing evidence that post-pandemic F2F is able to overcome academic gaps that occurred during the pandemic, also highlights an "unusual phenomenon" that tends to show contradictions. The level of competency achievement actually decreased significantly after the pandemic. This occurred in a small group of students with learning style categories VIIN and LVK. Students in group 6 experienced a decrease in test scores of -0.925 to -3.358 (tables 2 and 4). Statistically, the pandemic has a negative correlation with the grades obtained by students. This means that the lower the number of students with cases of Covid-19, the higher the test scores obtained (Abadía Alvarado et al., 2023). It should be that with the end of the pandemic and students being able to study again with F2F, their academic achievement can improve. Especially considering the fact that the pandemic has caused a large academic gap, especially for students who have just started school or are at the beginning level (Kuzmanic & Valenzuela, 2024) and students' reluctance to have to study online continuously (Lemay et al., 2021) but what happened was the opposite. F2F after the pandemic caused students' academic achievement to decline. Of course this makes us wonder "why" and there are many possibilities why this phenomenon could occur. Among them are the adjustments to curriculum standards carried out during the pandemic including learning outcomes, teaching materials and assessments.

The pandemic conditions with all the limitations and problems make it impossible to enforce the current curriculum standards. Education stakeholders make curriculum adjustments because they realize that the distance learning process does not allow the use of existing curriculum standards. The existing curriculum standards should be designed for face-to-face learning conditions only without considering the abnormal learning conditions due to the pandemic. For this reason, there is a belief that students cannot be forced to achieve learning outcomes and master the material but the learning process supports it. As a result, the pandemic curriculum standards were reformulated which were not as ideal as the curriculum standards before the Covid-19 outbreak hit.

In Indonesia, Permendikbud number 719/P/2020 is an educational policy product issued by the Indonesian Minister of Education during the ongoing pandemic to provide flexibility to schools to determine a curriculum that suits students' learning needs. This regulation stipulates that educational units in special conditions can simplify core competencies and basic competencies (KI-KD) independently. This regulation also stipulates that educational units are not required to complete all curriculum achievements as a basis for class promotion or graduation. Through this regulation, the term "emergency curriculum" is known, the mission of which is that during the pandemic students focus on completing competencies that are considered crucial and as a prerequisite for being able to continue to the next level of education (Kemdikbud, 2020)

Post-pandemic, the ideal curriculum standards were re-implemented with the return of the F2F learning process. I think this condition has the potential to be the reason why students' academic achievement after the pandemic has

actually decreased. Students who are accustomed to less than ideal learning outcomes are then faced with achieving ideal learning outcomes post-pandemic. At this point, students experience academic difficulties and stress, causing their academic achievement to decrease or not as high as during the pandemic. Academic stress is a physical and psychological impact experienced by students due to changes in the learning process and other sources such as demands for assignments, the number of subjects taken, time management, and difficulty understanding the material (Kumalasari & Akmal, 2024). Changes in curriculum standards and the learning process to F2F post-pandemic could potentially be a source of stress for students.

Students feel burdened, unprepared and anxious about the ideal post-pandemic curriculum standards. Cleofas et al (2023) emphasizes that anxiety can trigger academic stress and high anxiety can increase academic stress. Or the decline in academic achievement can also be influenced by students not being able to follow post-pandemic material because the material that was during the pandemic was not fully mastered. Therefore, students must catch up on the material first. Van Lancker & Parolin (2020) revealed that it is very likely that after F2F is re-implemented, students will experience a serious decline in academics. Asadullah (2024) stated that the opening of schools after the pandemic is not enough to guarantee normal academics. On the one hand, the majority of students (72% of elementary school students and 59% of secondary school students) feel satisfied and happy to be able to return to face-to-face learning at school. However, on the other hand, reports were found that one-fifth of students had difficulty catching up on learning, one-third of students did not learn more, 40% of students were worried about their academic decline compared to other friends, and even with the above conditions, students felt they did not get more attention from teachers and parents.

It can be reasonably deduced that the recuperation of students who have been adversely affected by the pandemic during the initial transition from online learning to face-to-face instruction is of paramount importance. This is because it is becoming increasingly evident that the introduction of face-to-face learning cannot immediately address the issue of learning loss for all students.

Students with learning styles such as visual, interpersonal, or logical may experience difficulty re-adapting to F2F learning environments due to their existing familiarity with the advantages of online learning features, including images, videos, graphics, and learning materials that are presented in an engaging and comprehensive manner. This is consistent with the findings of the article, which indicate that some students perceive unanticipated benefits of online learning. These include students who experience challenges in forming friendships and interacting with others, as well as students who require additional time to comprehend material and complete assignments compared to their peers. Online learning affords students the autonomy to pursue their studies at their own pace (Ladson-Billings, 2021). The resurgence of face-to-face learning in the post-pandemic era no longer accommodates students with certain learning styles, such as visual and logical, who have during the pandemic discovered a congruence between the rhythm and pace of online learning and their own learning needs.

To address the needs of students with these characteristics, educators can implement a range of solutions in the classroom. *First*, it is important to recognize that not all learning challenges associated with the pandemic are inherently negative. Some of these factors stimulate the development of innovative learning media, including the accessibility of learning management system (LMS) platforms in academic institutions. Prior to the pandemic, such platforms were not widely utilized by educators and students alike. As reported by the OECD in 2021,

approximately 72% to 75% of the 134 countries surveyed opted for a blended learning approach at the secondary education (Vincent-Lancrin et al., 2022). A number of studies have examined how teachers respond to the sustainability of online platforms after schools reopen. The findings indicate that teachers are more likely to continue using online teaching platforms after considering a number of factors, including ease, convenience, and expected learning outcomes, as well as high technical interest and perceived teaching effectiveness. (Bajaj et al., 2021; Dincher & Wagner, 2021).

Therefore, it is imperative that educators and school policymakers consider the LMS platforms that have been developed during the pandemic and the high rate of mixed remote learning options in secondary education. Doing so will ensure that all students' learning styles can be accommodated and that students' academic performance is improved after the pandemic.

Secondly, in addition to the departure from the LMS learning media with which students are already conversant, the pandemic has also compelled educators to adapt their practices to accommodate technological advancements. In this context, post-pandemic teachers may enhance face-to-face learning through the integration of cutting-edge technology. Teachers who have been required to develop their abilities in creating engaging instructional materials with a variety of technologies over the course of the three-year pandemic must continue to do so, even as learning resumes in the traditional face-to-face format. As Hill et al. (2020) have observed, the pandemic has placed a new responsibility on teachers, namely the ability to teach both in-person and online classes. The integration of technology into the classroom allows students to learn at their own pace and in any environment, including the ability to revisit learning videos as needed. This shift in pedagogy requires teachers to develop skills beyond merely lecturing and presenting, necessitating the ability to adapt to technology (Ladson-Billings, 2021).

The findings of Adhya and Panda's (2022) research indicate that teachers in India have a favorable outlook toward technology-based learning in the wake of the pandemic. The disruption to the traditional school environment has bolstered teachers' confidence, engagement, and capacity to integrate technology into the learning process (Winter et al., 2021).

It is imperative that educational practices evolve in a forward-thinking manner, rather than reverting to outdated methods. It is imperative that educators continuously develop their abilities to create materials with the latest information technology. This is essential for ensuring that the teaching and learning transaction process in the classroom is able to nurture all students with various learning styles. This is corroborated by a study conducted by Ahmad et al. (2024) which indicates that the diversity of the current education system is manifested in various forms, including differences in learning styles, cultural backgrounds, interests, and talents. In order for learning in the classroom to accommodate this diversity, teachers must create student learning experiences by utilizing technology.

Thirdly, the flipped learning method represents a potential solution for students with learning styles that are visual, interpersonal, or logical, who have exhibited a decline in academic performance. This method entails having students study teaching materials (video, quiz, PPT, article, etc.) that have been prepared by the instructor and made available on the school LMS platform prior to the commencement of the class. As posited by Toivola et al. (2023) there are three pedagogical considerations that underpin the importance of flipped learning for teachers to apply to students. These are the triggering of students to form self-regulated learning and the strengthening of students' active participation in learning. Furthermore, another crucial rationale

for flipped learning is the acknowledgment that each student possesses unique characteristics and abilities, necessitating encouragement for independent learning. Furthermore, numerous other articles have indicated that the flipped learning method transforms students' passive learning experience into an active involvement in learning, enhances students' interest in learning, and improves satisfaction with teaching materials. (Karaoglan-Yilmaz et al., 2024; Masruddin et al., 2024). urthermore, it mitigates the likelihood of student failure and enhances student preparedness by up to 29% at the outset of learning, fostering confidence in achieving learning outcomes (Johnson et al., 2023; Spencer et al., 2023).

CONCLUSION

If the vaccine successfully stops the Covid-19 outbreak that has hit the world for 3 years, then the re-implementation of F2F after the pandemic has succeeded in ending learning loss. Through this study, it was reported that students who tended to have VIIN or LV or LVK learning styles did not show a decrease in competency achievement. On the contrary, the F2F that was first followed by students after the pandemic succeeded in having a positive impact on increasing student competency achievement. However, it should be underlined that a small number of students did not respond the same as the majority of other students. This refutes the general assumption that F2F after the pandemic will definitely not cause learning loss.

Thus, students who are able to adapt to the learning transition do not experience problems with their academic achievement. On the other hand, students who have problems with academic achievement after schools reopen after the pandemic are suspected of not being able to adapt well to the transition of more difficult material changes, high expectations for the grades obtained must be higher, and more difficult and more subject assignments after F2F. This study took data from when schools first reopened and F2F was first implemented after 3 years of the pandemic. It seems that some groups of students in the VIIN and LVK learning style categories who experienced a decline in academic achievement after the pandemic needed more time to be able to adapt to the F2F transition and the demands of the curriculum that had been standardized again.

The findings of this research have significant implications for educators and those responsible for formulating educational policy. Firstly, the resumption of face-to-face learning in the post-pandemic era should not be viewed as a return to the conventional methods of learning that were previously employed in schools.

The school LMS platform that has been available during the pandemic, as well as teachers' competence in adopting technology in learning, represent two key areas where teachers can make a commitment to creating innovative F2F learning experiences after the pandemic. Furthermore, encouraging teachers to adopt the latest technology approach in learning is a strategy that can be effectively implemented. This approach should be continued in order to accommodate the diverse learning styles and speeds of students.

Secondly, the research findings indicate that the implementation of F2F learning after the pandemic is not sufficient to fully recover the academic performance of all students who were affected by the pandemic. It is imperative that educators identify students who require additional support and provide them with tailored attention, particularly those who exhibit slower learning rates compared to their peers. The flipped learning approach can be an effective strategy for students with specific learning styles who thrive in independent learning but face challenges in traditional classroom settings. Consequently, post-pandemic learning loss recovery initiatives can effectively address the needs of all students affected by the pandemic.

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