



Learning Loss Typology: A Proposed Framework for Categorizing Learning Loss During COVID-19 Pandemic

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ABSTRAK

Learning loss telah menjadi isu global seputar ruang lingkup pendidikan akhir-akhir ini. Penelitian ini bertujuan untuk mengusulkan kerangka kerja pengkategorian learning loss selama pandemi covid-19 berdasarkan hasil review artikel. Pendekatan kualitatif telah digunakan dengan memanfaatkan tinjauan sistematis dan kualitatif-kritis sebagai desain penelitian. Subjek utama melibatkan 26 artikel yang dipilih secara purposive. Semua data dianalisis secara interaktif sebelum tujuan ditetapkan, dan hasilnya digambarkan melalui grounded theory dengan dimensi pembelajaran Anderson & Krathwohl. Hasil penelitian menunjukkan bahwa kerugian belajar pada ranah afektif meliputi kurangnya motivasi belajar, interaksi sosial, harga diri, keterlibatan, dan minat. Sumber kerugian belajar pada ranah afektif adalah faktor geografis, faktor sosial ekonomi, dan kesenjangan digital; dan pada ranah psikomotor adalah ketimpangan pendidikan dan rendahnya kompetensi untuk beradaptasi dengan situasi. Penanggulangan kerugian belajar pada ranah afektif adalah peningkatan fasilitas belajar dan pembinaan mental siswa pada ranah kognitif yaitu penyesuaian kurikulum dan penyesuaian metode pembelajaran; dalam ranah psikomotorik merupakan peningkatan keterampilan literasi.

ABSTRACT

Learning loss has been a global issue around educational scope lately. This study aimed at proposing a framework for categorizing learning loss during the covid-19 pandemic based on article review results. A qualitative approach has been employed utilizing systematic and qualitative-critical reviews as the research design. The main subject involved 26 articles that were selected purposively. All data were analyzed interactively before the objective was set, and the results were portrayed through grounded theory by Anderson & Krathwohl's dimensions of learning. The results show that learning loss in the affective domain includes a lack of learning motivation, social interaction, self-esteem, engagement, and interest. The sources of learning loss in the affective domain are geographical factors, socio-economic factors, and the digital divide; and in the psychomotor domain are educational inequality and low competence to adapt to situations. The mitigation of learning loss in the affective domain is improving learning facilities and mental care for students in the cognitive domain is adjusting the curriculum and adapting learning methods; in the psychomotor domain is an enhancing literacy skill.

1. INTRODUCTION

The growth of ICT tremendously affected education systems, one of which is the advance of online learning (Diamandis & Kotler, 2009; Suwastini, Dewi, et al., 2021; Trilling & Fadel, 2009). Online learning has been found to be a learning strategy with positive and negative impacts. Benefits of online learning argued by previous studies include (1) providing learning autonomy; (2) fostering motivation; (3) promoting collaboration, and (4) exercising ICT skills; and (5) facilitating learning flexibility (Suwastini et al., 2023; Rahmayanti et al., 2022). Meanwhile, experts also argued the challenges faced while applying online learning, including improving learning participation and language skills, enhancing learning autonomy and collaborative learning, lack of device compatibility, time allocation, and unstable internet connection (Cahyani et al., 2021; Dantes et al., 2022; Suwastini, Nalantha, et al., 2021).

Despite the numerous benefits found by educators, there has yet to be as much success with the deployment of online learning as had been anticipated. It was not able to overcome the challenge that is referred to as learning loss. Previous study perceived that online learning led to social interaction loss (Bali

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& Liu, 2018). It is because the interaction between learners and their teachers is facilitated through online circumstances. The technical issues of online learning eliminated their opportunities to build synchronous communication (Harnin et al., 2022; Palvia et al., 2018). In line with this argument, it is also revealed that online learning causes learners to undergo contemplation, remoteness, stress, and lack of learning motivation (Arkorful & Abaidoo, 2015; Gillett-swain, 2017; Rahmayanti et al., 2021).

Learning loss is the term used to describe the phenomena that occur when students lose interest in something they are supposed to be learning and stop trying to do so (Azevedo et al., 2020; Simal et al., 2022). People are said to have experienced learning loss if they suffer any loss of information or skills, explicitly or generally (Ayuningtyas et al., 2023; Zhdanov, 2022). Learning loss can also be characterized as a combination of learning deterioration of information (Angrist et al., 2021; Zhdanov et al., 2022). Society in the United States believes that learning loss is a problem experienced only by students from lower economic backgrounds up to middle economic backgrounds who need help to operate and access online facilities to achieve their educational goals. On the other hand, the Indonesian definition of learning loss describes a stage in which students experience a decrease in their learning skills, a loss of emotional or psychological growth, a tendency to choose not to continue their education, and difficulties in finding work due to a lack of competencies (Azevedo et al., 2020; Simal et al., 2022). There, the learning loss creates a significant possibility of a significant divide between students and an interruption in their education.

Since 2019, the global education system has been impacted negatively by the Covid-19 outbreak because of the widespread closure of schools. This circumstance had a significant impact and prompted all parties involved in education to engage in substantial conflict. According to the explanation by UNESCO, around 1.6 billion children have temporarily stopped attending school since the COVID-19 Pandemic (Dawadi & Simkhada, 2020). Because of the abrupt shift in learning mode during the Covid-19 outbreak, the government and educators must work together to solve the learning challenges as soon as possible (Karuniasih, 2022; Kohli et al., 2021). However, using online learning as the only remedy available at the time cannot prevent learning problems. Learning loss has arisen globally in several aspects of learning.

There is strong evidence that education worldwide suffers from a loss of educational opportunities due to the closing of schools during the Pandemic. According to previous study the most significant effect of the COVID-19 pandemic is that it has accelerated the shift away from traditional learning methods and toward e-learning (Adi et al., 2021). The unanticipated change caused tremendous problems, such as a lack of infrastructure, an improper technique that needed to be centered on the needs of the children, a lack of family support, and a loss of interest among the pupils (Adi et al., 2021; Angrist et al., 2021). Researchers believe that those concerns cause students' cognitive skills to deteriorate and lead to a loss of learning.

The ideal learning process should concern three domains: cognitive, affective, and psychomotor (Bagon et al., 2018; Hoque, 2016). The cognitive domain emphasizes intellectual aspects, such as knowledge, understanding, and thinking skills. The affective domain contains several elements of feelings and emotions, such as interests, attitudes, appreciation, and ways of adjustment. Further, psychomotor domain focuses on motor skills such as handwriting, typing, swimming, and operating machines (Adi et al., 2021; Oktari et al., 2019). Each domain is categorized into knowledge, comprehension, application, synthesis, and evaluation. However, this original taxonomy was revised since out of the six levels, three were revised, and two of the levels were shuffled with their titles reflecting the actions or verbs instead of nouns (Adi et al., 2021; Dowell et al., 2020). It was proposed and revised by previous study the six levels of the revised taxonomy included remembering, understanding, applying, analyzing, evaluating, and creating (Anderson et al., 2001).

Across nations, numerous definitions and dimensions of learning loss have been explored – proving that learning loss has recently emerged as a significant issue that warrants further investigation. The gap appears more expansive due to the lack of concern on the classification of learning loss resulting from those enormous descriptions. This article takes the opportunity to compile and analyze previous research on learning loss, specifically during the COVID-19 Pandemic, under various conditions to develop a typology of the phenomenon. Further findings provided a form of learning loss during the COVID-19 Pandemic in specific dimensions, which enables researchers and educational stakeholders to have a deeper understanding of learning loss in various contexts. Therefore, any future study about the loss of learning can be carried out to the fullest extent possible by employing this writing as the primary benchmark.

2. METHOD

The research employed a qualitative library research approach (Dixon-Woods et al., 2005; Onwuegbuzie et al., 2012). These designs could occupy the study process and help the researcher reach the objective and classify the typology of learning loss during the covid-19 Pandemic from various findings. The

first step was identifying the topic. During this step, learning loss typology is selected as the main topic to be discussed. This selected topic became the basis for determining and proposing research questions.

The data were collected through browsing and skimming information from articles, books, and specific documents. Further, in the fourth step, it is necessary to determine the database, research tools, and the application for referencing them. Four databases are involved in this library research, i.e., Eric, Google Scholar, ScienceDirect, and ResearchGate. Various articles on learning loss identified from the database were the primary sources. Meanwhile, Google Scholar was chosen as the main browsing application to provide open sources. The following diagram clearly illustrates the library research design adopted in this study is show in **Figure 1**.

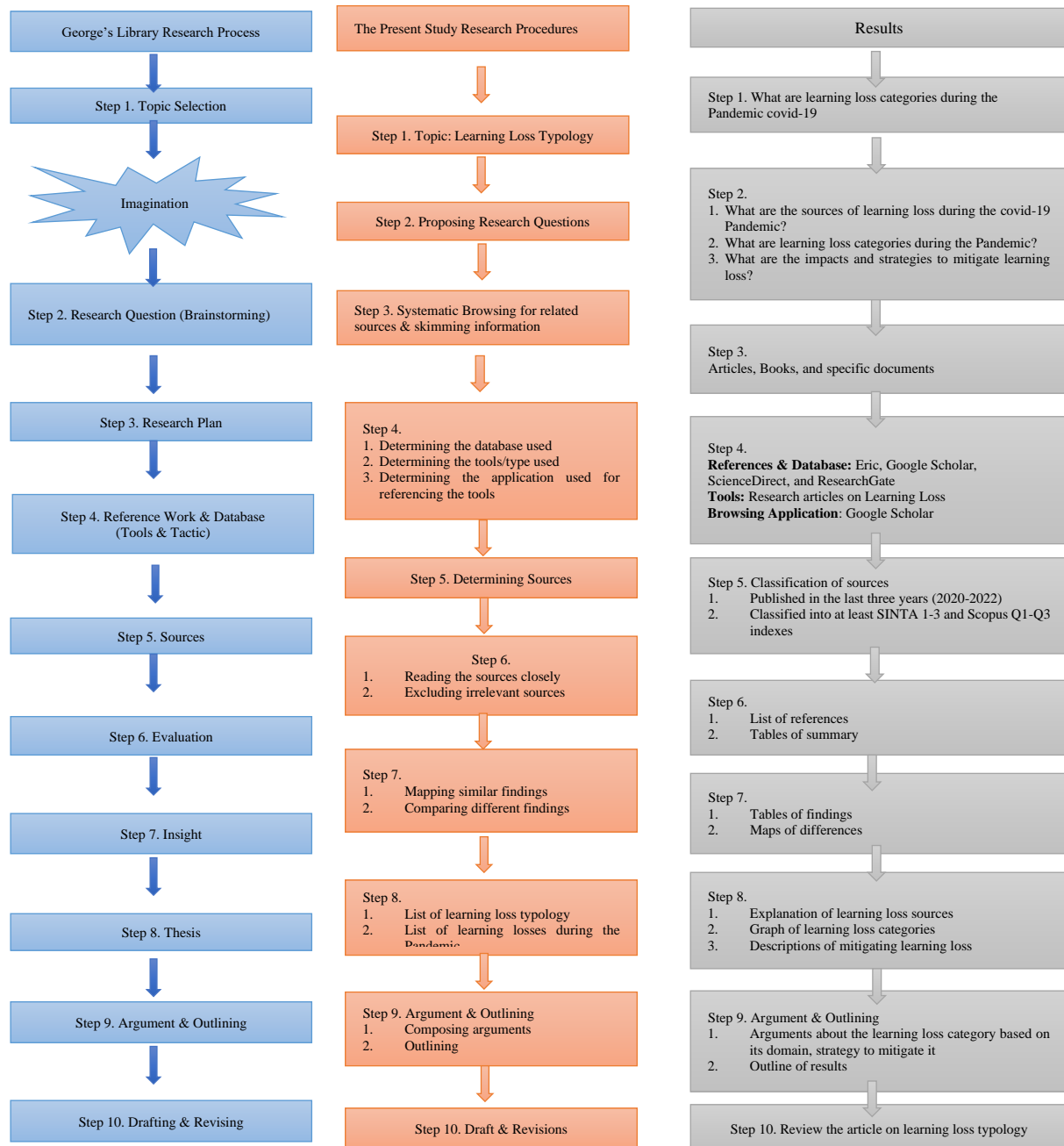


Figure 1. Research Design

The fifth step is determining sources. In this step, the sources were determined based on some specific criteria. The sources should be classified into inclusion criteria such as (1) published in the last three years (2020-2022); classified into at least SINTA 1-3 and Scopus Q1-Q3 indexes; and (3) selected from databases, i.e., Eric, Google Scholar, ScienceDirect, and ResearchGate. The next step is reading sources and

excluding irrelevant data. Through this step, 26 articles were reviewed critically to obtain comprehensive insight into their differences. Then, the data were classified into the table and categorized based on each domain of learning loss. The seventh step is mapping similarities and differences results of the relevant studies. The eighth step was done by creating a list of data sources. In this stage, the theses were composed into three categories, i.e., explanation of learning loss sources, learning loss categories, and strategies to mitigate learning loss.

Creating an outline and draft was done in the ninth step. The outline consisted of an argument about the sources of learning loss, the learning loss category based on its domains, and the strategy to mitigate it. The draft was portrayed in the form of tables and supported by a brief supported explanation. The final results of the outline were represented after the last step. The previous drafts of the article were developed in detail into a review-worthy article on learning loss.

3. RESULT AND DISCUSSION

Result

After the data were analyzed, three main findings could be illustrated to answer the research questions. Those are (1) sources of learning loss; (2) categories of learning loss; and (3) strategies to mitigate learning loss. Each finding is explained in the form of a table. From 26 selected articles, 12 articles described the sources of learning loss. The detailed findings can be seen in [Table 1](#).

Table 1. Sources of Learning Loss during the Covid-19 Pandemic

No.	Research	Types	Sources of Learning Loss
1	(Angrist et al., 2021; Azevedo et al., 2020; Onyema et al., 2020; Zhdanov et al., 2022)	Articles	Inequality of education factor
2	(Adnan & Anwar, 2020; Cerelia et al., 2021; Onyema et al., 2020; Zhdanov et al., 2022)	Articles	Geographical factor
3	(Engzell et al., 2021; Oktariani et al., 2021; Panagouli et al., 2021)	Articles	Socio economic factor
4	(Adi et al., 2021; Onyema, Sen, et al., 2020)	Articles	Digital divide
5	(Andriani et al., 2021; Kohli et al., 2021; Onyema et al., 2020)	Articles	Lack of competence to adapt to the situation

As illustrated in [Table 1](#), the learning loss during the COVID-19 Pandemic occurred due to factors such as education inequality, geographical, socio-economic, digital divide, and lack of competence to adapt to learning circumstances. Further, several studies also revealed that learning loss could be categorized into three domains ([Hoque, 2016](#); [Krathwohl, 2002](#)). It is clearly described in [Table 2](#).

Table 2. Categories of Learning Loss During the COVID-19 Pandemic

No.	Domains	Types of Learning Loss	Research	Types
1	Affective	Lack of learning motivation, social interaction, self-esteem, engagement, and interest	(Adnan & Anwar, 2020; Andriani, Subandowo, Karyono, & Gunawan, 2021; Angrist et al., 2021; Arsendy, Gunawan, Rarasati, & Suryadarma, 2020; Arzaqi & Romadona, 2021; Elihami, 2021; Kohli et al., 2021; Kutza & Cornell, 2021; Onyema et al., 2020; Pasani & Amelia, 2021; Sawarkar et al., 2020; Simal et al., 2022)	Articles
2	Cognitive	Losing cognitive competencies in (1) acquiring new words, (2) spelling, (3) math/numerical literacy, and (4) reading.	(Angrist et al., 2020, 2021; Arzaqi & Romadona, 2021; Cambaz & Ünal, 2021; Castanheira et al., 2021; Engzell et al., 2021; Pasani & Amelia, 2021; Pasani & Amelia, 2021)	Articles
3	Psychomotor	Less practice, difficulty in expressing English capability in an authentic situation	(Engzell et al., 2021; Onyema, 2020; Oktariani et al., 2021; Panagouli et al., 2021; Sawarkar et al., 2020; Zhdanov, 2022)	Articles

Table 2 portrayed that numerous students have suffered three domains of learning loss, i.e., affective loss, cognitive and psychomotor. Each domain contributed to various types of loss experienced by students during teaching and learning. Many experts believe that learning loss can be prevented through effective learning strategies. Table 3 explains the effective strategies for teachers to prevent learning loss.

Table 3. Effective Strategies in Mitigating Learning Loss

No.	Mitigating Strategies for Learning Loss	Research	Types
1	Adjust the curriculum	(Angrist et al., 2021; Arsendy et al., 2020)	Articles
2	Adapt learning and teaching method	(Kutza & Cornell, 2021; Munawaroh & Nurmalasari, 2021; Pasani & Amelia, 2021; Wahyudi, 2021)	Articles
3	Enhance learning facilities	(Arzaqi & Romadona, 2021)	Articles
4	Enhance Literacy Skills	(Engzell et al., 2021; Pasani & Amelia, 2021)	Articles
5	Facilitate students' mental care	(Cambaz & Unal, 2021; (Pasani & Amelia, 2021)	Articles

Discussion

Sources of Learning Loss

The word learning loss appears to be an all-encompassing concept that can refer to various aspects of impaired learning. In several studies, learning loss is referred to as learning deterioration (Angrist et al., 2021), academic loss (Sawarkar et al., 2020), and general loss (Zhdanov, 2022); nonetheless, all conceptions believe that it refers to a loss in the capability of learning as a consequence of disruptions on both the micro and the macro levels.

According to the findings of studies, several factors contribute to learning loss. On the other hand, the following are the factors that have been brought up the most. The unequal access to educational opportunities caused by closing schools contributes to declining academic achievement (Zhdanov et al., 2022). The Pandemic limits the number of educational opportunities available to disadvantaged children, students living in distant places, and students with special needs. The shift toward internet-delivered education will not be able to meet all of our needs, especially those of our children with special needs or impairments (Azevedo et al., 2020; Onyema, Sen, et al., 2020). Additionally, the educational system contributes to the loss of knowledge. The rapid transition to online education amid a pandemic precludes the government and educators from adapting the curriculum to the unfolding events (Al Hashimi et al., 2022; Angrist et al., 2021). In reality, educational quality varies from region to region. In Indonesia, most schools require several supports, including suitable infrastructure, qualified teachers, and supportive parents. Some of them continue to need more information access opportunities. Ineffective communication is limited by a need for more restricted information and digital competency, contributing to learning loss.

The second one is geographical factor. A prior study found that rural students have a higher chance of experiencing learning loss (Cerelia et al., 2021). Distance or online education becomes more challenging in developing nations where Internet connection is unequally distributed. Online education yields unsatisfactory outcomes in undeveloped countries such as Pakistan, where most students have restricted internet access due to technical and economic issues (Adnan & Anwar, 2020; Onyema, Sen, et al., 2020). In contrast, distance education has little impact on developed nations. Students that grow up in developed countries can study with enough infrastructure, spend more time studying, and receive more significant support from their parent's education level (Bali Swain & Yang-Wallentin, 2020; Zhdanov et al., 2022).

Numerous people lose their jobs due to the Pandemic, drastically reducing their prospects of earning a significant income. Additionally, it affected students who come from low-income families. Online education must meet the demand for technology such as laptops, computers, and Wi-Fi (Machmud et al., 2021; Oktariani et al., 2021). However, low-income families cannot do so and face significant technological obstacles. Most low-income families and more than 42 percent of average families struggle to provide e-learning gadgets in their homes. This issue undoubtedly harmed students' access to information and education. It demonstrates that economic disparities have a crucial influence on learning loss (Engzell et al., 2021; Panagouli et al., 2021).

The lack of online learning facilities creates the most significant opportunity for learning loss. Distance education is conducted via a learning platform, which requires suitable facilities. Nonetheless, the vast majority of students struggle with the digital divide. These include limited Internet access, unequal ability to afford electronic devices, and inadequate electricity (Adi et al., 2021; Onyema, Sen, et al., 2020). In addition, human resources, specifically teachers' pedagogic, contribute to the cause of loss of learning. The transition toward E-learning necessitates teachers to find the most efficient means of generating the

optimal solution for students. However, their inability to utilize technology affects their potential to provide engaging and inventive learning.

The fast changes in learning systems become the first challenge for students to adjust to the learning situation (Adi et al., 2021; Andriani et al., 2021). Students, teachers, and all global communities experience culture shock due to the learning shift. The quarantine during the Covid-19 outbreak affects their mental health. Social isolation and strict health procedures create a painful experience for them. This issue increases students' anxiety, stress, and lack of concentration on their studies – increasing the possibility of losing competencies. (Kohli et al., 2021; Oktariani et al., 2021). In addition, the various learning styles are essential in getting an education. Some students may be able to tolerate a noisy atmosphere, while others struggle to do so. The disadvantages of learning from home for students who require a tranquil environment and complete conveniences result from the school's closure.

Proposed Framework for Categorizing Learning Loss

The circumstances surrounding the Pandemic that caused the loss of learning can have a variety of causes, and consequently, the effects of this phenomenon can also be diverse. The impact of learning loss has had a negative upon almost all aspects of the learning domains. Although this is not the case, numerous assumptions continue to hold the belief that learning loss has been restricted primarily to the cognitive domain. However, concerning the dimensions of learning that were taken from revision of Bloom's taxonomy: affective, cognitive, and psychomotor, the process of learning is not entirely reliant on the cognitive dimensions but rather on the combination of all three (Hoque, 2016; Krathwohl, 2002). In other words, the cognitive domain is not the only dimension to highlight as being affected by learning loss.

Previous study describes that the affective domain encompasses our feelings, attitudes, and emotions (Hoque, 2016; Zhdanov et al., 2022). This dimension covers how we deal emotionally, such as our feelings, values, appreciation, enthusiasm, motivations, and attitudes. Learning skills in thinking processes, such as processing information, developing understanding, applying knowledge, resolving issues, and performing research, are under the cognitive domain of learning. The psychomotor domain goals are associated explicitly with specific physical functions, reflex responses, and interpretive movements. Perception, a predetermined response, a mechanism, a complex overt response, adaptation, and the ability to originate all fall under this category.

Affective Domain

The affective dimension takes a considerable part of the learning loss during the COVID-19 Pandemic. Numerous studies have shown that during the COVID-19 Pandemic, the affective domain gets more attention directed to its loss, in contrast to the cognitive domain, which is thought to be the one that is disrupted the most. The loss in the affective domain is mainly in the form of motivation, social interaction, self-esteem, engagement, and interest (Adnan & Anwar, 2020; Andriani et al., 2021; Arzaqi & Romadona, 2021; Onyema, Sen, et al., 2020). These changes may have occurred due to the covid-19 Pandemic, which prompted a rapid transition to an online learning environment. The disruptions and difficulties that occurred during the time that students participated in online learning led to a reduction in the amount of information that they were able to acquire, including fewer opportunities for face-to-face engagement, inadequate access to the Internet, a constrained amount of time for educational pursuits, and insufficient support from family members (Angrist et al., 2021; Kohli et al., 2021; Simal et al., 2022). This condition has such a terrible effect on students that it can even cause them to lose their sociality and self-confidence when it comes to learning and facing the future (Elihami, 2021; Pasani & Amelia, 2021; Sawarkar et al., 2020).

Covid-19 inherently reduces the one-on-one interaction between instructors and students (Adnan & Anwar, 2020; Andriani et al., 2021; Arsendy et al., 2020). In the challenging circumstance of having no direct interaction, teachers tend to send hand out assignments without offering feedback, which leads to the considerable risk that students do not learn anything from their teachers (Adnan & Anwar, 2020; Arsendy et al., 2020; Kutza & Cornell, 2021). This results in a decrease in one's interest in learning as well as their level of motivation. According to the prior research findings, a drop in contact and motivation among students affects their level of participation. The outcome was discovered through classroom interaction and presence (Elihami, 2021).

In addition, a low level of students experienced disruptions in their ability to obtain class information due to unequal internet access, which influenced their self-esteem. It is not a coincidence that students who originate from families with low incomes, on average, have a much-increased chance of not learning as much as they could (Elihami & Melbourne, 2022; Engzell et al., 2021). These online mechanisms are the most potent contributors to the loss of learning. Because there is less interaction among students, this hurts their interest, engagement, motivation, and self-esteem.

Cognitive Domain

The cognitive domain encounters a loss of learning because the affective domain has been disrupted in an extended sense. The system which fully implements online learning caused a significant loss of learning in the cognitive aspects (Arzaqi & Romadona, 2021; Castanheira et al., 2021). The Pandemic grows emotional problems which in turn impact a decline in cognitive ability and information processing (Hüseyin Zahid Cambaz & Ünal, 2021; Castanheira et al., 2021) low students' motivation and self-esteem exclusively influence the student's ability to understand the learning concepts. Students lose interest in learning as a result of the pandemic condition, which leads to a decline in their academic performance.

Previous study propose that learning loss refers to a decline in one's cognitive abilities over time, also known as learning deterioration (Angrist et al., 2021). The amount of this decline varies depending on the educational policies in place (school week, learning-time exposure). Learning loss results in short-term (self-esteem, motivation, and engagement) and long-term (cognitive degradation) effects that are roughly equivalent to a two-year gap inside the usual circumstances (before the school shutdown); this effect is worse than the effect of the summer holiday (losing around 10 percent of cognitive capability) – strengthening the sense that cognitive loss has occurred as the accumulation of affective loss (Angrist et al., 2021; Engzell et al., 2021).

The types of cognitive loss include struggle to develop language aspects and math. In the United States, Netherlands, Turkey, and Africa, students have experienced cognitive loss in several things, i.e., (1) acquiring new words, (2) spelling, (3) math, and (4) reading (Angrist et al., 2020; Hüseyin Zahid Cambaz & Ünal, 2021; Castanheira et al., 2021). Students tend to have difficulties learning new words due to the limitations of teachers' feedback, which affects their ability to produce sentences. Turkey's students prove that their graphic on the number of new words acquired by students dropped from 2019 to 2021, specifically in 2020 when the Pandemic first appeared (Angrist et al., 2021; Hüseyin Zahid Cambaz & Ünal, 2021). Additionally, in the Netherlands, the learning loss in these three subjects – math, spelling, and reading – exceeds around three percentile points, with standard deviations of 0.08 percentage points. It was shown that the losses are 60 percent more than before the Pandemic and that there was either very little or no learning development throughout the Pandemic. Further, the Pandemic's unequal distribution of educational opportunities in Indonesia has resulted in the loss of reading and numerical literacy (Panagouli et al., 2021; Pasani & Amelia, 2021).

Findings figure out young learners experienced more cognitive loss, especially in numerical and reading literacy, due to the online class during the Pandemic; adults, on the other hand, appear to be more independent learners. The appearance of learning loss, particularly in students' academic performance, results from socio-economic disparities and a deficiency in providing student feedback (Arzaqi & Romadona, 2021; Panagouli et al., 2021). The use of fully online forms, in a kindergarten setting, for instance, can cause significant learning loss in the long term, particularly in terms of students' levels of accomplishment. Since the young learner stage is the building block of children's learning continuity, learning loss has raised concerns that it will influence children's cognitive, social, and emotional development in the future (Al Mamun et al., 2022; Arzaqi & Romadona, 2021).

Psychomotor Domain

The affective and cognitive domains are responsible for slowing down the psychomotor domain. Because there is less opportunity for students to exercise their cognitive skills during the school shutdown, the psychomotor domain is most likely to suffer as a result (Engzell et al., 2021; Panagouli et al., 2021). The student's capacity to follow the progression of their learning was further hampered by the loss of the opportunity to practice. The students' lack of opportunity to acquire material from the Internet at home contributed to their teachers' misinterpretation of the teaching they were given (Engzell et al., 2021; Onyema, Chika, et al., 2020). In English class, for instance, it has been discovered that students do not succeed in practicing how to express their English capability in authentic situations, or at the very least practice them in role-play situations - this is although the students are allowed to do so yet getting minimum results (Dasaradhi et al., 2016; Oktariani et al., 2021).

The psychomotor domain has received a relatively small amount of discussion as of late due to the widespread belief that it is the overhead consequence of recent learning loss. It is believed that the short-term issue of learning loss is the inability to practice disciplined study; however, looking overhead, there was a tendency also propose that if this circumstance continues to occur, subsequent generations will be hampered by the incompetence to face global challenges in their career (Onyema, Chika, et al., 2020; Sawarkar et al., 2020). It could negatively impact future generations. The ongoing scenario of insufficient practice would lead to the development of degraded skills among students and subsequent generations, resulting in the nation needing more human resources. It further explains why the psychomotor domain

was not extendedly addressed as the affective and cognitive domain – the effect of the psychomotor domain is on protracted effect, which makes this even more problematic.

Impacts and Strategies to Mitigate Learning Loss

All three major areas of learning, affective, cognitive, and psychomotor, are shown to be affected by learning loss. In the reviewed literature, the affected domain is stated explicitly and implicitly; nonetheless, all seem to agree that the disruption caused by learning loss has caused extensive harm. In addition, the review demonstrates a pattern of learning loss among students from different countries: learning loss in the affective, cognitive, and psychomotor.

Disrupted dimensions include motivation, social interaction, self-esteem, engagement, and interest. It appears to be the initial phase of learning loss, leading to the short-term impact of learning loss (Angrist et al., 2021; Sawarkar et al., 2020; Zhdanov, 2022). The critical complications would arise if these symptoms were persistently interrupted – reducing learning loss should be undertaken as early as possible. The long-term effect of learning loss is cognitive loss due to long-term affective domain loss and psychomotor domain impairment at the further stage (Angrist et al., 2021; Zhdanov, 2022).

Regardless of its causes and forms, learning loss is unquestionably something that should be eradicated to mitigate its chain impact. In some cases, the educational curriculum during the early Pandemic needed to be more ambitious and unrelated to students' skill levels. A complex curriculum risks leaving students permanently behind (Angrist et al., 2021; Arsendy et al., 2020). Teachers must be able to adapt the new curriculum and construct it with students' characteristics in mind to mitigate lost learning. In South Africa, the Department of Basic Education repackages curriculum due to school closures and a considerable reduction in a learning loss. This stage has required teachers to produce updated annual teaching plans (ATP) emphasizing basic skills and providing teachers with opportunities and permissions to prevent learning loss (Angrist et al., 2021; Mounika & Thamarana, 2018). Providing more access to teachers to adjust the curriculum independently, like in South Africa, could be adopted by other countries. At the same time, adjust the country's circumstances as well.

It is not a barrier for teachers to organize learning in several modes (online, offline, or blended learning), although the covid-19 outbreak requires a shift to online learning. When assisting students in adapting to learning, teachers should keep their attention on the subject matter being taught (Pasani & Amelia, 2021; Wahyudi, 2021). Reliable and insightful input is required. This argument is consistent with an expert's assertion that teachers should provide frequent feedback to maintain students' interest in the studied material. The teacher's competency plays a vital role in supporting kids with loss learning recovery because it fosters reflective thinking, analytic thinking, initiative, a focus on the future, self-awareness, resilience, and flexibility (Kutza & Cornell, 2021; Munawaroh & Nurmalasari, 2021).

Enhance facilitation, especially on the ICT. Infrastructure and facilitation, such as electricity, Internet connectivity, and equipment (laptop/computer), must be enhanced to bridge the digital divide necessary for online learning. Policymakers must assist underachieving children and remote schools. Giving free Wi-Fi or device support for a rural area could be helpful. Enhance literacy skills, especially reading and numerical literacy. The rapid learning transition to online mode has led to declining reading and numerical literacy (Arzaqi & Romadona, 2021; Engzell et al., 2021; Pasani & Amelia, 2021). Over 60% of students lose their math, reading, and spelling ability after the Pandemic (Arzaqi & Romadona, 2021; Engzell et al., 2021). It indicated that government, schools, and parents must take part in recovering reading and numerical literacy. Likewise, digital literacy must be well mastered by teachers and parents to manage and accomplish the children's development.

Facilitate students with mental care. There is a significant potential that students will develop emotional issues due to the Pandemic. Anxiety or post-traumatic stress symptoms may develop as people have less time for social connection (Kohli et al., 2021; Munawaroh & Nurmalasari, 2021). As students' physical and mental health significantly impacts their academic progress, the method for mitigating loss of learning is to assist them in returning to their everyday lives (H Zahid Cambaz & Unal, 2021; Pasani & Amelia, 2021). To prevent or recover from learning loss, schools must provide cognitively and socioemotionally supportive social services and educational activities. In addition, a more positive point of view on recent learning loss might provide a glimpse of hope to mitigate its harmful exposure. Most studies indicate that ICT-based future education will be influenced by pandemic-related learning loss. Everyone has learned from the Pandemic to live and utilize technology in schooling much more effectively. Most studies also believe that learning loss during the Pandemic is the shifting process for future education with ICT based.

India might be the most adaptive country to mitigate learning loss. However, the covid-19 outbreaks have damaged them so hard. As described by previous study it was believed that the development of online learning could assist students in India in mitigating the impact of the pandemic on their

educational opportunities (Sawarkar et al., 2020). Most students have a favorable attitude toward online learning and even greatly appreciate it. Online learning may allow them to continue their education, which is preferable to doing nothing. For students to get the most out of their online education, the vast majority believe that online education should be further expanded in their country, particularly in the areas of online assessment and online evaluation. When this occurred, most students in India became aware that online education may become the predominant mode of instruction shortly.

The narrative has pictured that in addition to learning loss at the extended level, learning gain has also occurred when the circumstance is viewed positively. Learning loss could transform the education paradigm and prepare nearly everyone for future technology integration. Current learning loss may also have the potential to resurrect an old method of teaching in which learning may be done anywhere and at any time. Learning loss has just represented a new learning pattern and fostered digitalization in education. It should be emphasized more so that its negative impact can be interpreted as suggestions for improving the gaps in contemporary education.

The long-term impact of learning loss is identified as disrupting cognitive and psychomotor domains the most. Some effective strategies have also been recognized to mitigate the effect of learning loss, including adjusting the curriculum, adapting teaching-learning methods, enhancing ICT infrastructure, enhancing literacy skills, and facilitating students with mental care. These results contribute implications for teachers and future researchers. Teachers can prepare anticipated learning strategies to fulfil and mitigate the student's loss. Furthermore, future researchers have reliable sources on the learning loss category and become their supplementary cites on similar studies.

4. CONCLUSION

Based on the reviewed articles, learning loss could be further categorized into three main dimensions of learning: affective, cognitive, and psychomotor. Hence, learning loss during the COVID-19 Pandemic could be classified as learning loss in affective, cognitive, and psychomotor domains. The disruptions among these dimensions seem varied, yet, the cognitive domain gets more disruptions among other dimensions. Most of the loss occurred are grounded in two primary sources: internal (competence to adapt to the situation) and external (inequality in education, geographical factors, socio-economic issues, & the digital divide) factors – external factors seem to appear the most, worsened by the circumstance of Pandemic covid19 itself. Relating to the effect of learning loss, it was figured out that loss in the affective domain is the short-term effect, the first symptom of learning loss' adverse effects.

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