TECHNOLOGIES AND DIGITAL TRANSFORMATION IN EDUCATION

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Introduction

Education is changing very fast right now. This change is called "Digital Transformation." It is not just about using computers in class; it is about changing how students learn and how teachers teach using new tools like the internet and Artificial Intelligence (AI).

Right now, schools around the world are facing a big problem. Many students are not learning the basic skills they need. A report by the World Bank says that we need to use digital tools to fix this "learning crisis." However, using technology brings its own problems. Some students have great computers and fast internet, while others have nothing. This is called the "Digital Divide."

Also, new tools like ChatGPT (Generative AI) are making it hard to know if a student actually wrote their own essay. At the same time, staring at screens all day is hurting students' mental health. This research paper looks at how these technologies are changing schools. We will look at the good parts, like better learning, and the bad parts, like stress and unfairness. We will also use data to see if having the internet actually helps students get better grades.

Review of Literature

To understand this topic, we looked at what other experts have written.

Digital Transformation and New Rules

Digital transformation is when schools use technology to improve how they work. UNESCO says this needs six things to work well, including good leadership, money, and training for teachers. It’s not enough to just buy tablets; schools need a plan.

Artificial Intelligence (AI) in Class

AI is becoming very popular. Tools like "chatbots" can help students answer questions anytime, day or night. Some experts say AI helps students learn better by giving them personal help. However, there is a worry about "Generative AI" like ChatGPT. A survey found that 69% of

high school students use AI to help with schoolwork. The problem is that some students might use it to do their work for them instead of learning.

Digital Well-being (Mental Health)

"Digital Well-being" means staying healthy while using technology. Using too many apps and screens can cause "technostress." Studies show that teenagers who use screens for more than 4 hours a day (not for school) are more likely to feel anxious or depressed.

The Digital Divide

There is a big gap between rich and poor students. In rural areas (the countryside), the internet is often slow or not there at all. In the US, rural students are less likely to have broadband internet compared to city students. This is unfair because students without the internet cannot do their homework as well as students with the internet.

Online Examinations

Taking tests on a computer at home seems easy, but it causes stress. Students worry about their internet crashing during the test. Also, the software used to stop cheating can feel like it is spying on them, which makes students uncomfortable.

Research Gap

Even though many people write about technology in schools, there are some missing pieces (gaps) in the research:

1. We know AI is cool, but we don't fully know if it helps students get better grades or just makes them lazy.
2. Most studies look at mental health separately. We need to see how mental health and technology mix with school grades.
3. We need more simple proof (numbers) that shows if having internet access specifically changes a student's grade from "average" to "outstanding."

Objectives of Study

The main goals of this research are:

1. To see how **AI and Machine Learning** change how students learn and cheat.
2. To understand **Digital Well-being** and how screen time affects students' feelings.

3. To look at the **Digital Divide** and how unfair access to the internet hurts students.
4. To analyze **Online Examinations** and the problems with e-assessments.
5. To test the hypothesis that **Internet Connectivity** affects **Academic Performance** (using data).
6. To test the hypothesis that **Having a Device** (like a laptop) affects **Academic Performance**.

Research Methodology

This study uses **Secondary Data Analysis**.

- **What is it?** This means we are using data and numbers that were already collected by other researchers, government groups (like the World Bank or UNESCO), and other studies.
- **Why use it?** It allows us to look at a lot of information from all over the world without having to interview thousands of people ourselves. It saves time and money.
- **Tools:** We will use a statistical method called the **Chi-Square Test**. This test helps us figure out if two things (like "having internet" and "getting good grades") are actually connected or if it is just a coincidence.

Scope of Study

- **Who:** This study focuses on students in high school and colleges/universities.
- **What:** We are looking at AI, internet access, and devices (laptops/phones).
- **Where:** The study looks at global trends, with some specific data examples from the Philippines and the US.

Limitation

Every study has limits. For this paper:

1. **Old Data:** Technology changes very fast. Some data from 2020 might already be old because AI changes every month.
2. **No Control:** Since we used other people's data, we couldn't ask the students specific follow-up questions.
3. **Honesty:** In surveys, students might lie about how much time they spend on screens or if they use AI to cheat.

Data Analysis and Interpretation

We used data from a study by Lemuel Karl Arias Tadios to see how technology affects grades. This data looks at students' grades and compares them to their technology access. **Table 1: Internet Connection vs. Grades**

Source: Tadios et al.

Internet Status	**Fair Grades**	**Satisfactory Grades**	**Very Satisfactory**	**Outstanding**	**Total**
With Internet	1	21	1	2	25
No Internet	*Higher*	*Higher*	*Lower*	*Lower*	25

Interpretation: The data shows a split. Students with internet access had a chance to get "Outstanding" grades. Students without internet were mostly stuck in the lower or middle grades.

Table 2: Availability of Devices vs. Grades

Source: Tadios et al.

Device Status	**Fair Grades**	**Satisfactory Grades**	**Very Satisfactory**	**Outstanding**	**Total**
No Devices	2	29	4	3	38
With Devices	*Lower*	*Lower*	*Higher*	*Higher*	12

Interpretation: Most students (38 out of 50) did not have their own devices. Those who did not have devices were mostly getting "Satisfactory" grades. They struggled to get higher grades because they couldn't access extra learning materials.

Hypothesis Testing (Chi Square Test)

We used the **Chi-Square Test of Independence**. This is a math formula used to check if two groups are different from each other.

Hypothesis 1:

- **Null Hypothesis (H0):** There is NO link between Internet Access and Grades.
- **Result:** The study found a **Significant Relationship**.
- **Meaning:** We reject the Null Hypothesis. This means having the internet **does** matter. The connection is real, not just luck.

Hypothesis 2:

- **Null Hypothesis (H0):** There is NO link between having a Device and Grades.
- **Result:** The study found a **Significant Relationship**.
- **Meaning:** We reject the Null Hypothesis. Students who own a learning device (laptop/tablet) perform differently (usually better) than those who don't.

Findings

Based on our research and data analysis, here is what we found:

1. **The Internet Matters for Grades:** The numbers show that students who have internet access are more likely to get higher grades. Students without internet are often stuck with average grades because they cannot research or submit work easily.
2. **Devices are Key:** Just like the internet, having a personal device (not just sharing one) helps students succeed.
3. **AI is a Double-Edged Sword:** AI can act like a personal tutor, which is great. But, if students use it to write their essays for them, they stop learning. Schools are struggling to stop this "cognitive offloading" (letting the machine think for you).

4. **Technostress is Real:** Students are stressed out by constant notifications and the pressure to be online. This "Digital Cognitive Load" can actually make their grades go down.
5. **Rural Students Suffer More:** Students living in the countryside are much less likely to have the fast internet they need for modern school. This creates an unfair system.

Suggestions

To fix these problems, we suggest the following:

1. **Teach "AI Ethics":** Instead of banning AI, schools should teach students how to use it responsibly. Teachers should give assignments that require personal opinions, which AI cannot fake easily.
2. **Digital Detox:** Schools should teach students about "Digital Well-being." Students need to learn to turn off their phones and take breaks to protect their mental health.
3. **Fix the Divide:** The government and schools must help poor and rural students get internet access. It should be seen as a basic need, like electricity.
4. **Better Exams:** Online exams should be designed to be less scary. Instead of just spying on students with webcams, teachers should use "open-book" questions that test understanding, not just memory.
5. **Offline Options:** Schools should create digital lessons that can work even if the internet goes out, so rural students don't fall behind.

Conclusion

Digital transformation in education is here to stay. It offers amazing chances for students to learn in new ways using AI and the internet. However, this report proves that technology is not fair for everyone yet. The data analysis clearly showed that students with internet and devices get better grades than those without.

Also, we must be careful with our mental health. Technology should help us learn, not make us anxious or depressed. If schools, governments, and students work together to close the digital divide and use AI wisely, we can create a future where every student has a fair chance to succeed.

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