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Social Networking Sites And The Adolescent Mind: Impact On Critical Thinking Among Higher Secondary Students In Odisha

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Abstract

In the quickly evolving digital age, social networking sites (SNS), such as Facebook, Instagram, WhatsApp etc., become increasingly important in the lives of teenagers. They have an impact on teens' brain development in addition to how they interact with one another. This study looks at how students in higher secondary schools in Odisha (Arts, Science, and Commerce) utilize social networking sites (SNS) and how it affects their ability to think critically. In order to determine whether there were changes in the critical thinking abilities of 150 students (50 from each stream) based on the degree to which they used social networking sites, we used paired t-tests, two-sample t-tests, and ANOVA. The results show that SNS has a statistically significant impact on the critical thinking abilities of students studying the arts and sciences, but not those studying commerce. The Comparative studies and ANOVA also showed that the effects of SNS on different streams had wildly disparate outcomes. According to the findings, children in both streams need different digital education techniques, and they should use social media responsibly to help their brains develop.

Keywords: Social Networking Sites (SNS), Critical Thinking, Higher Secondary Students, Academic Streams, Digital Literacy, Cognitive Development, Odisha

1. INTRODUCTION

Social Networking Sites (SNS) have become a big part of students' lives in the digital age. They have changed how students talk to each other, get information, and interact with academic and social content (Sahoo et al., 2024). Facebook, Instagram, Twitter (now X), WhatsApp, and LinkedIn etc, are more than just places to connect with friends; they are also informal learning settings that change the way people think, see things, and use critical reasoning (Mahapatra, 2024). These platforms are great for sharing information and learning together, but using them too much and not controlling what children watch raises crucial questions about

how they affect students' cognitive development, especially in areas like critical thinking (Samantaraya et al., 2022).

People all across the world now depend on digital technologies and social media. Because of them, a lot of people may readily find knowledge on any subject they want. 84% of teens also use social media regularly, and they are bombarded with too much information in their own lives. When you have to deal with so much information, skills like critical thinking and media literacy might help. Even though teenagers' cognitive skills are at their best and they are digital natives, most of them do not have very good critical thinking and media literacy skills.

The Greek words kriterion (norm, rule) and kriticos (able to discriminate) are where the word "critical thinking" comes from. It can be defined as drawing conclusions or making decisions based on particular rules. According to Watson and Glaser (2000), CT is a mix of abilities, knowledge, and attitudes. They concentrated on a few subskills that are part of CT:

1. making inferences, or being able to tell the difference between false and true conclusions based on the information given;
2. recognizing assumptions, or being able to tell the difference between facts and opinions
3. deduction, or being able to tell whether a conclusion was logically drawn from the information given;
4. interpretation, or being able to judge proofs, facts, and the relevance of conclusions; and
5. evaluation of arguments, their strength, relevance, and validity in relation to a given problem (Watson & Glaser, 2000).

People's minds can be thought of as having two systems: system 1 and system 2. People frequently say that System 1 is more intuitive, quick, automatic, emotive, focused on the entire, and works without conscious control. -System 2 employs deeper reasoning, keeps your attention, works slowly, follows a lot of rules, uses evidence, works with abstract ideas, forms plans, and thinks about a lot of different ways to solve an issue. It creates the grounds for CT and is often dubbed a controller, slow, analytical, or reflective thinking.

The Critical thinking is an important academic talent that helps to analyse, evaluate, and combine knowledge to make smart decisions. It is necessary for solving problems, communicating well, and doing well in school (Acharya, 2024). Since students in different fields of study, such as Arts, Science, and Commerce, use SNS in different ways, it is important to find out if these sites help or hurt their ability to think critically (Beri, 2023).

This research seeks to examine the relationship between SNS use and critical thinking among the college students with preference to the influence of the three a-cademic streams. The researchers employ paired t-tests, ANOVA, and two-sample t-tests to determine whether the use of social networking sites (SNS) benefits or rather harms the abilities of candidates to think critically and whether or not the experience varies in relation to the discipline of study.

The findings of this research are supposed to assist educators, policymakers, and educational establishments to design intelligent digital literacy curricula, promote ethically responsible behavior to the use of social media, and design stream-specific pedagogies that allow students to reason critically in the digital era.

1.1.Significance of the study

Students in higher secondary schools are increasingly using social networking sites (SNS) in the contemporary digital era. Although there are many social and educational advantages to these platforms, questions have been raised over how they affect students' cognitive abilities, especially critical thinking. Although critical thinking is crucial for both academic achievement and well-informed decision-making, the type and volume of SNS use may have an impact on how it develops. Even while digital platforms are becoming more and more prevalent in students' life, little is known about how SNS use impacts critical thinking in various academic fields, including the arts, sciences, and commerce. By contrasting how SNS affects critical thinking in students from various streams, our study aims to close this gap.

1.2.Rationale of the Study

Students in all academic fields are becoming more and more dependent on social networking sites, which makes it necessary to comprehend how these sites affect critical thinking and other crucial cognitive abilities. The ways that SNS affects pupils can differ greatly because every academic stream has its own unique learning processes. Examining this link can help educators and policymakers understand how kids' thinking skills are impacted by digital resources. In order to help schools create more effective digital literacy plans and specialized educational interventions, this study intends to further the field of digital education research by examining whether using social networking sites improves or impairs critical thinking.

1.3.Objectives of the study

I. To examine the comparative impact of social networking sites on the critical thinking abilities of higher secondary students from the Arts and Science streams.

II. To evaluate the differences in the influence of social networking sites on critical thinking among higher secondary students from the Arts and Commerce streams.

III. To assess the impact of social networking sites on critical thinking by comparing students from the Commerce and Science streams at the higher secondary level.

IV. To analyze the overall impact of social networking sites on critical thinking among higher secondary school students across the Arts, Science, and Commerce streams.

1.4.Hypotheses of the study

The hypothesis of the study on the basis of objectives are:

I. There is no statistically significant difference in the impact of social networking sites on critical thinking between higher secondary students from the Arts and Science streams.

II. There is no statistically significant difference in the impact of social networking sites on critical thinking between higher secondary students from the Arts and Commerce streams.

III. There is no statistically significant difference in the impact of social networking sites on critical thinking between higher secondary students from the Science and Commerce streams.

IV. There is no statistically significant difference in the impact of social networking sites on critical thinking among higher secondary students from the Arts, Science, and Commerce streams

2. LITERATURE REVIEW

This literature review is aimed at critically examining the existing studies on the correlation between the utilization of SNS and critical thinking, with the particular focus on its difference across disciplines. It also looks at the study's theoretical frameworks, major findings, and methodological techniques, pointing out any gaps that already exist and laying the groundwork for the current examination.

Ju'subaidi et al. (2025) studied the usage of the internet and social media among Indonesian high school students as a means to assist them on understanding the Islamic learning contents in a foreign cultural and educational environment. The survey revealed that students sought religious content on the internet and used online (such as WhatsApp groups) as well as offline (such as talks in extracurricular activities) forums to know more. These findings indicated that Islamic education was no longer teacher-centered but it was student-centred. They also demonstrated how as the students learnt more about the various religious views they became more open-minded and aware of the various religious views. This was an aspect of an overall tendency of students being more independent and reflective in their schoolwork particularly when they partake in technology.

Li and Qi (2025) looked into how arts education affects college students' cognitive growth. Their quantitative investigation showed that doing arts-based activities regularly was strongly linked to better critical thinking, creativity, and school success. Students who were more involved in the arts were better at analysing and solving problems and were better able to adjust to new academic requirements. These results showed how arts education can help kids grow in all areas and get ready to face academic and real-world obstacles with more cognitive flexibility.

Zimmermann and Tomczyk (2025) did a qualitative study to find out what teens like about Instagram-based health promotion. Their study, which included interviews and focus groups with 67 teens in Germany, showed that teens liked how Instagram might help them grow as people, connect with others, and become involved, especially through short, interactive formats like reels, quizzes, and polls. People did, however, worry that the information felt too instructive, that there wasn't enough personalisation, and that features like comments and notifications could put their privacy at risk. The study showed how important it is to make health promotion information that teens will like, such as being real, short, visually appealing, and culturally sensitive. This supports the uses and gratifications theory.

Choudhury et al. (2025) looked into how Social Media Disorder (SMD) and academic procrastination are related among Indian college students. In their study, they revealed that men and women differed significantly in the level of SMD and that, SMD was connected to intrusive thinking, fatigue, and procrastination. The multiple mediation model was employed in the study to demonstrate how SMD has more than merely contributed to academic procrastination as a direct effect but it also makes people work intrusively and become tired as a mediating effect. These findings demonstrated that excessive use of social media could be damaging to your mental and emotional well-being which may affect your schoolwork.

Borhaneddine and Aymen (2023) looked further examined the impacts of social media addiction on the critical thinking ability of EFL learners in third-year in a smaller scale. In a research based on both qualitative and quantitative study, they found out that social media could be beneficial to learning, however, it was addictive and this made them difficult to think critically and analytically. Even those teachers who participated in the research stated that they could notice that children became less interested and less capable of reasoning and this factor can signify that excessive use of social media affected higher-order cognitive skills negatively.

Arrivillaga et al. (2022) examined the effect of the three variables; critical thinking disposition, perceived stress, and PSU individually on the engagement of Spanish teens in school. They found out that individuals who experienced less control over their thinking capabilities felt more stressed and this was related to increased PSU and poorer academic interest. Such findings supported the earlier hypotheses such as the I-PACE approach and maladaptive coping theory. They demonstrated that adolescents may resort to the use of smartphones to cope with negative emotions and this may influence their performance in school.

Parvar et al. (2022) examined the effectiveness of structured critical thinking training program in promoting less harmful use of the virtual social networks among high school students. Their quasi-experimental study proved that the individuals who received the training in critical thinking engaged in significantly less harmful online behaviours and more positive attitudes towards the usage of social media compared to the control group. These findings demonstrated that educational activities that seek to enhance the cognitive and assessive abilities of teens in the virtual environment can be employed in real life.

Dharmastuti et al. (2020) investigated into the factors that may cause critical thinking among social media using teens. The research discovered that the art of appropriating digital media was of great essence in

enhancing critical thinking. However, it was unexpectedly discovered that the more confidence you had in your capacity to control your behaviour, the less attentive you could have been to disclosing information, and thus, damaging your thought process. This made it appear that in order to make sound decisions online, it may be easier to be over-confident in yourself which demonstrates the complex nature of psychology in digital literacy.

The research by **Abbas et al. (2019)** was one of the first large works that considered both the positive and negative aspects of social media and the effects that they have on the attitude of university students to studying in Pakistan. Their study demonstrated that in as much as, were it easier to share knowledge and get involved through the use of social media, the negative outcomes, e.g. distraction, misinformation, as well as reduced attention to schoolwork, were more pronounced, than the positive outcomes. The present research rested on the social gratification theory and emphasized that the duality of social media made it both more and less convenient to advance sustainable education.

3. RESEARCH METHODOLOGY

The subsection of the research methodology are as follows:

3.1. Research design

In this research, the researcher employs a quantitative, descriptive-comparative research methodology to examine the influence of the Social Networking Sites (SNS) on the higher secondary students of three coded academic streams namely Arts, Science and Commerce, on their critical thinking abilities. This design is available to compare and analyse the levels of critical thinking on a statistical basis among the students of varied educational backgrounds who utilise social networking sites.

3.2. Population and sample

The target population is made up of Class XI and XII students in government and private schools all over Odisha. Using stratified random sampling, a sample size of 150 students was chosen to make sure that each academic stream was equally represented:

- **Arts:** 50 students
- **Science:** 50 students
- **Commerce:** 50 students

Stratification helped keep the number of people in each stream fair and lower the chance of bias in the samples.

3.3.Research tools

Two research tools were used to gather data:

- **SNS Usage Scale:** A self-made Likert-type questionnaire that measures how often, why, and how intensely people use social networking sites. Pilot testing and expert consultation confirmed the accuracy and validity of the scale.
- **Critical Thinking Skills Test (CTST):** A standardised tool that has been changed for higher secondary pupils to test skills like inference, appraisal, logical reasoning, and interpretation.

Both tools were quite reliable, with Cronbach's alpha coefficients above the acceptable level of 0.70.

3.4.Data collection procedure

Before the pupils and their parents gave their permission, the school administration gave their authorisation. The surveys were given during school hours in controlled classrooms to make sure everyone was on the same page and to keep distractions to a minimum. The period of gathering data took about three weeks.

3.5.Statistical techniques used

It is used the following statistical tools to look at the data we collected:

- **Paired t-test:** To see how using SNS affects critical thinking within each academic stream.
- **Two-sample independent t-test:** To look at the changes in how SNS affects critical thinking between any two streams.

We used SPSS software to do all of the statistical analyses, and we set the significance thresholds at 0.05 and 0.01.

3.6.Ethical considerations

The study followed ethical research rules. People who took part did so of their own free will, and they were told what the study was about. There was tight protection of privacy and anonymity. Participants were not put under any psychological or academic pressure, and the data was only used for study.

4. DATA ANALYSIS AND INTREPETATION

The data used descriptive and inferential statistics methods like paired sample t-tests, independent sample t-tests, and one-way ANOVA to look at the data. The data used these methods to assess the study's hypotheses and to see how SNS use affected people's ability to think critically. The results are shown in tables, and then each discovery is explained in detail to support the study's goals.

I. **"There is no statistically significant difference in the impact of social networking sites on critical thinking between higher secondary students from the Arts and Science streams."**

Table 1 displays the effect of social networking sites on students' critical thinking abilities in the science and arts streams.

Table 1: Paired T-Test Results – Impact of SNS on Critical Thinking Across Streams

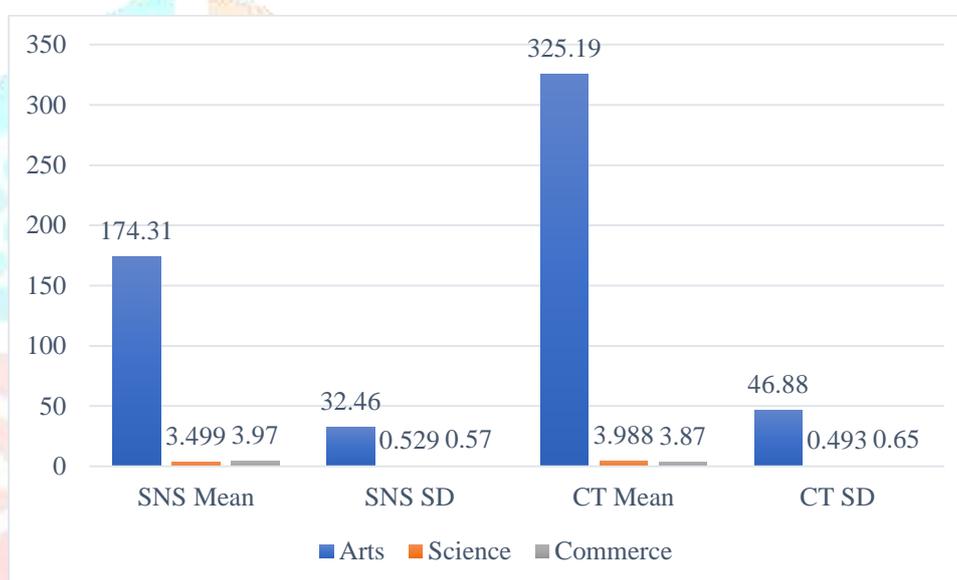| Stream	N	SNS Mean	SNS SD	CT Mean	CT SD	t-value	Sig. (2-tailed)	Hypothesis Decision
Arts	50	174.31	32.46	325.19	46.88	-46.89	0.000	Reject H_0
Science	50	3.499	0.529	3.988	0.493	-11.26	0.000	Reject H_0
Commerce	50	3.97	0.57	3.87	0.65	-11.26	0.076	Accept H_0

Figure 1: Graphical Presentation of Mean and SD of SNS and CT

The mean score for critical thinking (M = 325.19, SD = 46.88) was significantly higher than the mean score for using social networking sites (M = 174.31, SD = 32.46), according to the paired t-test. The null hypothesis was rejected since the t-value was -46.89 and the p-value was 0.000.   Additionally, there was a significant difference among science students (t = -11.26, p = 0.000), indicating that SNS improved their critical thinking. The null hypothesis is accepted in this case, though, because the change among Commerce students was not statistically significant (p = 0.076). This indicates that their capacity for critical thought was either unaffected or barely affected by utilizing SNS.

II. There is no statistically significant difference in the impact of social networking sites on critical thinking between higher secondary students from the Arts and Commerce streams.

Table 2 compares SNS and critical thinking scores within each stream to demonstrate that the effect is stream-specific.

Table 2: Paired Sample T-Test Results – Comparison of SNS Usage and Critical Thinking Scores Within Individual Academic Streams

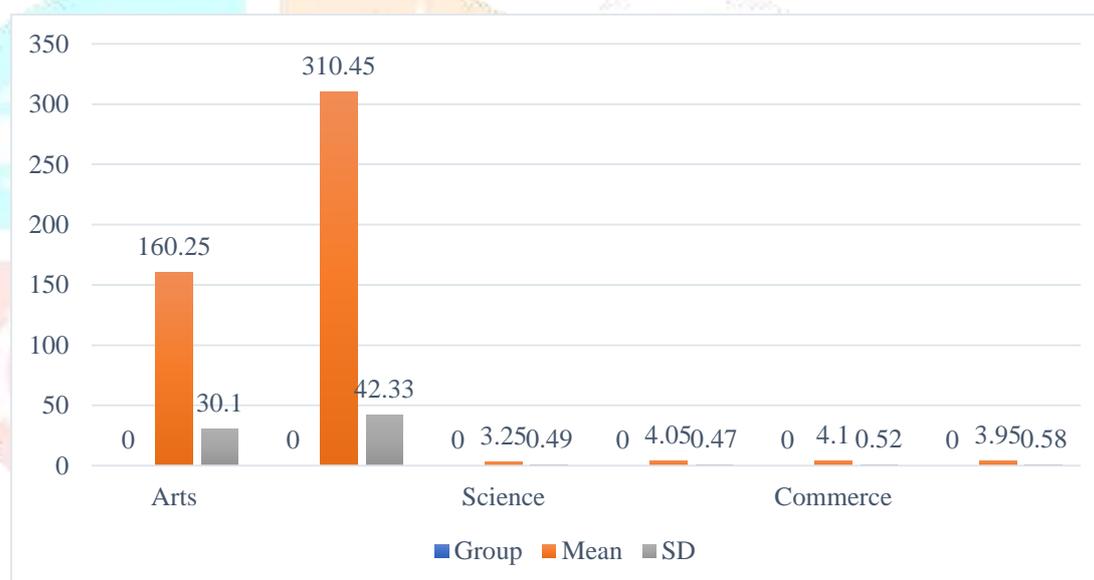| Stream	N	Group	Mean	SD	t-value	Sig. (2-tailed)	Hypothesis Decision
Arts	50	SNS	160.25	30.1	-38.12	0.000	Reject H_0
		CT	310.45	42.33			
Science	50	SNS	3.25	0.49	-10.45	0.000	Reject H_0
		CT	4.05	0.47			
Commerce	50	SNS	4.1	0.52	-1.89	0.062	Accept H_0
		CT	3.95	0.58			

Figure 2: Graphical Presentation of T-Test Results

For arts students, there was a significant and significant difference between their critical thinking scores (M = 310.45) and SNS use (M = 160.25; t = -38.12, p = 0.000).   The positive correlation is supported by the fact that the mean in science increased from 3.25 to 4.05, t = -10.45, p = 0.000.   However, with a p-value of 0.062, Commerce students did not demonstrate a significant difference between critical thinking (M = 3.95) and social networking (M = 4.10).   Therefore, using social networking sites encourages critical thinking in the arts and sciences but not in commerce.

III.   **There is no statistically significant difference in the impact of social networking sites on critical thinking between higher secondary students from the Science and Commerce streams.**

According to Table 3's paired t-test results, social networking significantly improves critical thinking in both the arts and science streams.

Table 3: Paired T-Test Results – Comparison of SNS Use and Critical Thinking Scores by Stream

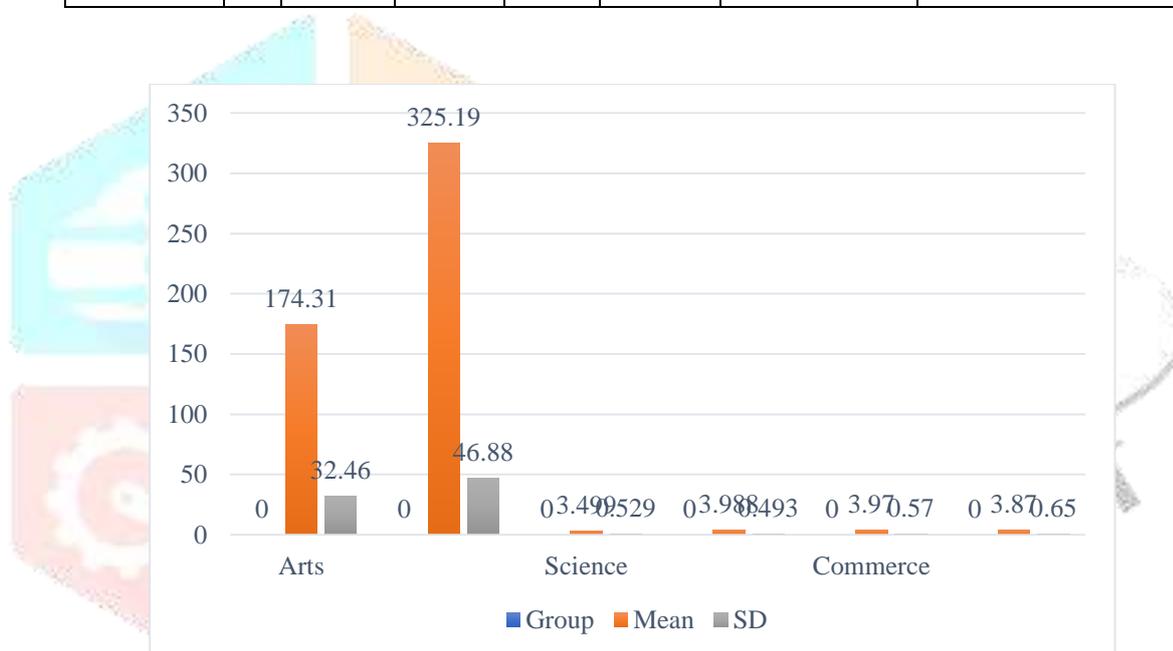| Stream	N	Group	Mean	SD	t-value	Sig. (2-tailed)	Hypothesis Decision
Arts	50	SNS	174.31	32.46	-46.89	0.000	Reject H₀
		CT	325.19	46.88			
Science	50	SNS	3.499	0.529	-11.262	0.000	Reject H₀
		CT	3.988	0.493			
Commerce	50	SNS	3.97	0.57	-11.262	0.076	Accept H₀
		CT	3.87	0.65			

Figure 3: Graphical Presentation of Comparison of SNS Use and Critical Thinking Scores by Stream

There was a big jump in arts students' critical thinking scores (M = 325.19) from their SNS usage scores (M = 174.31), with a very low p-value of 0.000. There was also a big improvement for science students (p = 0.000).

The difference was not statistically significant for Commerce students (p = 0.076), which means that using SNS did not have a quantifiable effect on their ability to think critically. These results imply that the effect of SNS on cognitive growth is different for each academic track, with Arts and Science students getting more out of it than Commerce students.

IV.   <u>There is no statistically significant difference in the impact of social networking sites on critical thinking among higher secondary students from the Arts, Science, and Commerce streams.</u>

Table 4 shows pairwise comparisons that were done to look at the difference in how SNS affects critical thinking in different academic streams.

Table 4: Two-Sample T-Test – Differences in SNS Impact on Critical Thinking Between Streams

Comparison	N (each)	Mean Difference	SEM	t-value	p-value	Sig. at 0.05	Sig. at 0.01	Hypothesis Decision
Arts vs. Science	50	0.342 vs 0.490	0.049	-2.26	0.024	Reject H$_0$	Accept H$_0$	Significant at 0.05 level
Arts vs. Commerce	50	0.342 vs -0.096	0.049	6.01	0.000	Reject H$_0$	Reject H$_0$	Highly significant
Science vs. Commerce	50	0.490 vs -0.096	0.043	8.42	0.000	Reject H$_0$	Reject H$_0$	Highly significant

The findings indicate significant differences: Science students use SNS to think more critically than Arts students, as evidenced by the significant difference between the two groups (t = -2.26, p = 0.024) at the 0.05 level. At the 0.01 level, there are significant differences between Science and Commerce (t = 8.42, p = 0.000) and Arts and Commerce (t = 6.01, p = 0.000). These findings demonstrate that, in terms of how SNS impacts their cognitive abilities, students in the Commerce stream differ significantly from those in the Arts and Science streams.

The ANOVA results in Table 5 support the findings of the two-sample test by examining the distinct effects of SNS on the three academic streams.

Table 5: ANOVA for all streams

Students	N	Mean Difference	SEM	F Value	p Value	Result
Arts	50	0.342	0.049	38.64	0.00	**Reject the Null Hypothesis**
Science	50	0.490	0.043			
Commerce	50	-0.096	0.054			

The F-value of 38.64 and the p-value of 0.00 show that the groups are not the same in a statistically significant way. Because of this, we may reject the null hypothesis that SNS has the same effect on critical thinking across all streams. The mean differences were highest for science (0.490), then for Arts (0.342), and lowest for Commerce (-0.096). This means that SNS use is more strongly linked to critical thinking in Science and Arts students than in Commerce students.

Table 6: Summary of Hypothesis Testing Results

Hyp. No.	Comparison	Test	t/F Value	p-value	Decision
I	Arts vs. Science	Paired T-Test	-46.89 / -11.26	0.000	Reject H₀
II	Arts vs. Commerce	Paired T-Test	-38.12 / -1.89	0.000 / 0.062	Reject H₀
III	Science vs. Commerce	Paired T-Test	-11.26	0.000 / 0.076	Reject H₀
IV	All Streams (A, S, C)	t-Test & ANOVA	t = 6.01, 8.42; F = 38.64	0.000	Reject H₀

5. CONCLUSION AND FUTURE SCOPE

The researcher considered the effect of the use of Social Networking Sites (SNS) on the skills of critical thinking of higher secondary students in Odisha pursuing Arts, Science, and Commerce streams. The findings indicate that critical thinking among the Arts and Science students, which is enhanced by extensive usage of SNS, is improved significantly whereas its benefit cannot be extended to the Commerce students. These statistics indicate that SNS have positive effects on learning when they are used in school but in an appropriate manner and location. The ANOVA analysis and comparison revealed once more that the implications of SNS are highly dissimilar across streams. This indicates that schools must apply various digital literacy programs in every set of learners. The article demonstrates that SNS can be a potential tool of learning as well as means of altering mental thinking. SNS can contribute in critical thinking, material analysis and in the group learning experience, in case they are used properly and with mentoring. The difference in effects observed in various areas is an indication of the necessity to incorporate the stream-specific interventions and awareness campaigns, the importance of which is reflected in the need to have these customized according to the stream in question.

The future scope of the study is:

- **Digital Literacy Programs for Specific Streams**: Future study, the methods of developing and applying digital literacy stream-specific modules that would aid students to learn how to use social networking sites (SNS) as a critical thinking and learning tool could be investigated.

- **Longitudinal Studies on Cognitive Impact:** A longitudinal study may be carried out to determine the effect of long term use of social networking sites on developing a critical mind and also to determine whether the trends initially reported persisted or not.

- **Including Other Cognitive Skills**: In future studies, researchers may examine additional cognitive abilities, such as creativity, problem-solving, and decision-making, and they may possess a better understanding of the consequences of SNS on cognitive development of the teenagers.

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