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SLEEP AND ITS RELATION TO COGNITIVE FUNCTION

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ABSTRACT

Sleep can sometimes be something alot of students put secondary to health rather than considering it directly proportional to it. Sleep is a subliminal factor that you can feel the effects of when you don't get the sufficient time needed to rest your body. The required amount of time for students (generally teenagers)-as stated by experts- is 7-8 hours of quality, undisturbed sleep. This we find in the modern day to be very rare which should come as a concern as teenagers are yet to have their brains fully developed. Insufficient sleep may be a hindrance to that growth. This experimental project delves into the effects of sleep on cognitive function to see whether the relation of sleep to brain-stimulating activities are not mere myths (as argued by some experts).

HYPOTHESIS

It all narrows down to one question,
'Does sleep actually have a role in the long-term effect of cognitive function?'
In order to answer this question, we need to conduct an experiment to showcase how sleep can affect our focus and ability to grasp concepts on a more short-term basis.

EXPERIMENT: SLEEP AND ITS RELATION TO COGNITIVE FUNCTION

AIM: To study the effect of sleep on cognitive function and memory

THEORY: Sleep is responsible for the smooth-functioning of many bodily functions. It is an integral process of human life. Even though sleep may seem like a passive process, numerous studies have demonstrated the active brain during sleep. It helps to consolidate existing memories and to make new connections which inherently enhance performance on a variety of tasks. Sleep is not stagnant but it consists of many dynamic stages of sleep. There are four stages of sleep and EMG studies show how unique the brain activity is with each one. The first stage of sleep is very light and people are easily awakened.

During stage two sleep, people start to lose awareness of the outside world and their brain activity shows two unique characteristics: sleep spindles and K complexes. Stage three and four are also known as slow wave sleep and brain patterns show delta waves which are low frequency, high amplitude waves. Rapid eye movement (REM) sleep is the final stage of sleep, which displays brain activity similar to when we are awake.

METHOD:

1. 4 students of the same age group and the same grade (15-17) will be taken as volunteers and put on a specific sleep schedule.
2. The experiment will last for a total of 2 weeks. In the **first week** students will be required to sleep for a total of 8 hours-undisturbed, every night (7 nights) . In the **second week** ,the students will be required to sleep for no more than 5 hours-undisturbed, every night (7 nights).
3. The students will be segregated based on their overall academic performances the previous year (Grade 10). One set of 2 students are the ones that average higher than 90 per 100 marks overall (between 90-100) will be **GROUP 1**. The other set of students average less than 90 per 100 marks overall (between 80-89) will be **GROUP 2**.
4. Each will study in several sessions by applying "**The Pomodoro Technique of Studying**" where students will focus as much as they can for a specific amount of time (which should be constant) in one session and have a break after each session has concluded (which should be constant). Each will start a stopwatch before commencing their study session and end the stopwatch when they find their focus lessening. **The number of sessions will be subjective**.
5. The number of study sessions will be recorded. Each group will start their sessions at the same time- 9AM.
6. At the end of each week, the students will be assessed based on the material that they have studied for mainly in the past week.

OBSERVATION:

1st Week- 8 hours of undisturbed sleep

Day 1: students studied (by applying the pomodoro technique of studying) the same amount of material for a maximum of 3 study session(s) (**no. of sessions are subjective)**.

The predicted outcome was that all the students from both categories remained consistent throughout the week in their study sessions.

GROUP 1:

STUDENT A STUDENT B

Session 1 session 1

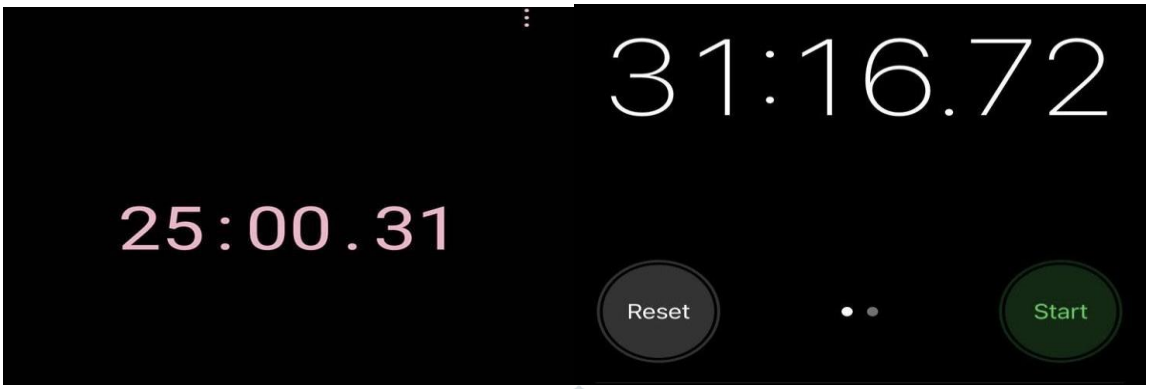
Student A- they followed a 25/3 session-where they studied for 25 minutes and took a 3 minute break. They did this for a total of 3 sessions

Student B- they followed a 45/10 session-where they studied for 45 minutes and took a 10 minute break. They did this for a total of 1 session.

Overall, both students A and B's performances were constant throughout their study sessions with not much deviation. Which was in **affirmation with the predicted outcome.**

GROUP 2:

STUDENT A STUDENT B



Session 1 session 1

Student A- followed a 25/5 session- where they studied for 25 mins and took a 5 min break after each session for a total of 3 sessions

Student B- followed a 30/10 session-where they studied for 30 mins and took a 10 min break after each session for a total of 2 sessions

Overall, student A was constant in their study sessions while student B studied 10 mins less than their intended time.

OBSERVATION:

For days 2,3,4,5,6,7- the pattern wasn't deviated. GROUP 2: Student B remained consistent with their study sessions from day 2 onwards.

2nd Week- 5 hours of undisturbed sleep

Day 1: students studied (by applying the pomodoro technique of studying) the same amount of material for a maximum of 3 study session(s) (**no. of sessions are subjective)**.

The predicted outcome was that all the students would face some difficulty in being consistent with their study sessions

GROUP 1:

STUDENT A STUDENT B

Session 1 session 1

Student A- they followed a 25/3 session-where they studied for 25 minutes and took a 3 minute break. They did this for a total of 3 sessions

Student B- they followed a 45/10 session-where they studied for 45 minutes and took a 10 minute break. They did this for a total of 1 session.

Overall, there was definitely a deviation in the consistency of the study sessions over the week.

OBSERVATION:

Student A:
On day 1, A significant decrease of their focus from 25 mins (on 8hrs of sleep) to 19-21 mins (on 5 hours of sleep) was seen in all 3 of their study sessions.
On day 2, the student's attention span had decreased a minute less.
From day 3 onwards, the student slowly became more consistent yet still a minute or two lesser than the predicted average (25 mins).

Student B:
On day 1, there was no decrease in their focus from 45 mins. Infact, the student was seen to have a slight increase in their attention span by 1 minute.

On day 2, the student's attention span had decreased from 46 mins to a whopping 40 minutes.
From day 3 onwards, the student's attention span remained consistent between 38-42 minutes, which was lesser than the predicted average (45 mins).

GROUP 2:

STUDENT A STUDENT B

Session 1 session 1

Student A- followed a 25/5 session- where they studied for 25 mins and took a 5 min break after each session for a total of 3 sessions

Student B- followed a 30/10 session-where they studied for 30 mins and took a 10 min break after each session for a total of 2 sessions

Overall, not much difference was seen in this group apart from the first 2 days.

OBSERVATION:

STUDENT A:
On day 1, an increase of 2 mins was seen from their usual study session.
On day 2, a decrease of 3 mins was seen from their usual attention span.
In the days following, this student remained consistent in their usual study routine.

STUDENT B:
On day 1, this student had a staggering decrease of 4 mins in their focus.

On day 2, the student regressed another 3-5 mins, totaling to a session of only 21-23 mins in all the study sessions

In the days following, this student remained consistent in their deviation of 1-2 mins in their study sessions.

CONCLUSION:

The students did face a challenge in focusing for their normal intervals of time mostly in the first few days on the 2nd week.

However, they did manage to cope up with this loss of sleep and remained consistent in their deviations on the 2nd week.

This however also shows the fact that on 8 hours of sleep, all the students were consistent in their sessions and were attentive throughout their sessions, following their Pomodoro sessions consistently.

In short, the answer to the hypothesis is **inconclusive.**