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# The Effect of yogic Practices on memory in children from a socioeconomically disadvantaged background: A Pilot Study

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***Abstract:*** *The purpose of this study is to look into how yoga practices affect schoolchildren's memory from low-income families at NOIDA BHAVISHYA NGO. Convenient sampling is used to carry out an yoga intervention for school going children, Age- 6 to 12 with socioeconomically weaker background. The results of this study project should provide insight into how schoolchildren's memory change over time.*

***Key Words:*** *Yogic practices, short-term memory, Digit memory test, socioeconomic disadvantaged children, Memory, cognitive functions.*

## 1. INTRODUCTION:

The capacity to recollect past experiences, knowledge, or abilities is known as memory. Yoga is regarded as a physical and mental discipline with ancient roots. Yoga helps people focus by integrating physical movement with awareness of their breath. Since learning and academic success heavily depend on the ability to retain information, memory problems are probably noticeable in the classroom. Problems could also show up in everyday chores and social interactions. A child's cognitive abilities, including memory, are crucial in the competitive world of today. Improving short-term memory in children is crucial for learning and improving academic and extracurricular performance. Yoga has been shown in studies to enhance the cognitive system**.** The aim of this research paper is to shed light on how yoga practices affect schoolchildren from low-income families' memory. The purpose of this study is to: • Determine the cognitive ability of children from low-income families.

• To comprehend how yoga practices affect memory and other cognitive functions.

• To be aware of how engaging in yoga practices alters one's cognitive state.

It is well known that children between the ages of six and twelve are developing, and that during this time in life, cognitive function must be improved. Children's brains are still growing, and it takes until they are about 25 years old for their memory systems to reach full maturity. Nonetheless, children can create memories and remember past experiences even in their early years.Children use three primary types of memory: long-term memory, short-term memory, and sensory memory. Working memory, another name for short-term memory, is the capacity to retain knowledge for brief intervals of time, usually less than 30 seconds. Youngsters utilize their short-term memory to store information that is required for immediate tasks, like calling someone or making a list of things they need to buy. The capacity to store and retrieve information over an extended length of time is known as long-term memory. The main worry is that children's cognitive impairment is causing developmental problems. This article will discuss the use of various yoga poses, such as suksham vyayam, suryanamaskar, asanas, and pranayama, to enhance cognitive function, especially short-term memory. This will be accomplished by using the DIGIT SPAN TEST, a short-term assessment tool. Pre-data will be collected prior to the intervention of yogic practices, which will be practiced five days a week for eight weeks, and post-data from the DIGIT SPAN TEST will be collected following the eight weeks. Next, we contrast the data from before and after. This procedure aids in the analysis of how yoga practices affect children's cognitive development, particularly with regard to memory.

## 2. LITERATURE REVIEW:

Yoga is a physical discipline and way of life that originated in ancient India and has gained immense popularity in the modern era. The three main components of the physical practice of yoga are pranayama (breathing exercises), dhyana (meditation), and asanas (postures). Stretching is only one aspect of yoga practice; other dynamic movements are linked to the breath. Indeed, yoga has been linked to a number of health advantages, such as improved flexibility, balance, physical stamina, and relaxation. But yoga also seems to have some potential psychological advantages. Regular yoga practice brings about awareness and deep focus by bringing the attention to the present moment without passing judgment.(Brunner et al., 2017). There has been a lot of interest lately in using yoga to help children with their cognitive skills. A study by Srikanth N Jois demonstrated that students between the ages of ten to twelve who practice super brain yoga had better short-term memory and selective attention. Super brain yoga begins with squeezing the acupuncture points on the ear with hands placed across the chest. The pose consists of 14 squats performed while breathing in the prescribed manner.(Jois et al., 2017) A study was carried out wherein the manipulation and maintenance of Working Memory was linked to a yoga program. which involved giving 43 participants Digit Span Forward, Backward, and Sequencing, as well as Letter-Number Sequencing, before and after 6 yoga sessions. The post-test results showed an improvement in working memory.(Brunner et al., 2017).In general, we've observed that a lot of people doesn't practice yoga. They have misconceptions about yoga, like believing it to be a part of a particular religion. people misinterpreted yoga as a set of Hindu religious rites. Even though yoga originated in Sanatan Dharma in India, it is now practiced all over the world. Regardless of their religious views, all people are made up of a body, mind, and soul. people also believe that yoga is out of style. Even in today's time, people have perception about Yoga as, it discourages productivity and encourages sluggishness. This perception is completely wrong, it has been proved and mentioned in many research papers and sacred texts that Yoga always encourages movement and discourages inaction. The Bhagavad Gita's entire message is centred on inspiring and encouraging the individual, who is trying to shun his responsibilities.(Karri et al., 2021)

In a particular study, school-age children from socioeconomically disadvantaged backgrounds were prompted to evaluate their cognitive function using yoga versus physical activity. Yoga was found to enhance schoolchildren's cognitive performance in the same way that physical activity did after a three-month intervention.(Chaya et al., 2012). Psychologists have examined one study to determine how yoga affects memory and cognition associated with stress. the amygdala and frontal cortex of the brain become more activated, and the proportion of gray matter in the brain increases as a result of yoga practice, which results in better cognitive functioning and reduced stress.(Mitra et al., 2020) A study was carried out in Raipur wherein forty, seventh-grade students participated in daily yoga practices for 60 days, encompassing surya namaskar, pranayama, meditation, and specific asanas. Later on, it was discovered that the control group had not improved and the experimental group had significantly improved. (Banerjee, 2014)The primary difference is that, whereas the published research used a sample of children aged 10 to 12, our research focuses on children from weaker socioeconomic backgrounds, ages 6 to 12. Additionally, the research on yoga practices only looked at the super brain; today, we're introducing children to asanas, pranayama, chanting, and mudras.(Jois et al., 2017)

## 3. OBJECTIVES OF THE RESEARCH PAPER:

- To understand the impact of yogic practices among children.
- To understand how yogic practices effect memory among children.

## 4. BODY

### Yoga according to ancient texts

### According to yoga vashistha

"Yoga mana prashmana upayah" is how Guru of Lord Rama Sage Vashishtha defines yoga in his book Yoga Vashishtha. Mana is the mind, prashmana is perfect peace and silence, and upay is a remedy or cure. (*Yog Vashistha.Pdf*, n.d.)

### According to Bhagavad geeta

**योगस्थः कुरु कर्माणि सङ्गं त्यक्त्वा धनञ्जय |**
**सिद्ध्यसिद्ध्योः समो भूत्वा समत्वं योग उच्यते || 48||**

**Be steadfast in the performance of your duty, O Arjun, abandoning attachment to success and failure. Such equanimity is called Yog.**

Shree Krishna refers to equanimity as Yog, or union with the Supreme, which involves accepting all circumstances with serenity. This comes from understanding that effort is in our hands, not results, and that results are for God's pleasure. Accepting fame, infamy, success, failure, and pain as God's will develops equanimity. (*Shrimad Bhagawat Mahapuran Vol 1 Gita Press Gorakhpur : Gita Press Gorakhpur : Free Download, Borrow, and Streaming : Internet Archive*, n.d.)

**According to Patanjali yog sutra**

In yoga sutra 1.2, the second sutra of book one, Patanjali lays out the definition and purpose of yoga

**Yoga is restraining the mind-stuff (Chitta) from taking various forms (Vrittis).**

yoga is the cessation of the modifications, or fluctuations, of the mind. This sutra gets right to the heart of why we practice yoga. No time is wasted. We learn right away what yoga is and why we practice it, while the rest of book expands on the topic and offers ways to go about calming these modifications of the mind.(Madhv & Beloved, n.d.)

**Importance of yoga in modern times**

The modern lifestyle has disrupted the balance between the mind and body, leading to a number of stress-related illnesses like cancer, heart disease, and hypertension. Clinical studies have confirmed that the rediscovery of ancient disciplines like Yoga, which combine lifestyles with potent infallible prescriptions for lasting mental peace, is the result of an attempt to prevent and treat these diseases.

Yoga is the science of contemporary living, of right living, and it ought to be a part of our everyday existence. It is more than just a weekly, two-hour hobby class. Yoga contains technical systems that support resilience, mental and physical energy harnessing, mind relaxation, and the development of an integrated personality. It serves as a means of achieving emotional equilibrium and achieving mental and physical harmony. Depending on their lifestyle, a person can select one or a combination of two or more of the numerous yoga paths, including hatha, bhakti, raja, jnana, and karma yoga. Asanas, relaxation, meditative, and pratyahara techniques, along with adhering to social and personal disciplines, can all be practiced. It is up to each person to determine which route best fits their needs, way of life, and personality. Yoga can be practiced with a regular lifestyle, but with distinct goals, a different mindset, and a different outlook on life and the people in it.

**Misconception about Yoga**

There are many misconceptions about yoga. One of the widely spread misconception is “yoga is just another form of exercise.” Researches have been conducted to know the benefits of yoga.it has been found that, It has features that go beyond those of any exercise and the ideal qualities of an exercise. Anyone can practice it, regardless of age or health. There are many different yoga techniques to suit different needs. Anyone can pick up the fundamentals of yoga quickly and start reaping the benefits right away. Yoga meets the requirement of maintaining both physical and mental well-being and can do so on its own, making it an ideal form of exercise regimen. Unlike popular gym exercises, yoga requires no expensive equipment. Yoga can be done in a group or alone, practically anywhere. Occasionally, supports and props are used to assist the body in achieving and maintaining a particular position. The degree of difficulty of the poses can vary significantly, and even the same posture can have different stages, variations, or degrees.(Karri et al., 2021)**.** Also there is myth, that yoga doesn’t have any health benefits. Yoga is essentially a lifestyle discipline with a spiritual focus. However, yoga's constituent parts have shown a range of physiological and therapeutic benefits that improve health. There is proof that yoga is a potent antidepressant on par with pharmaceuticals. Yoga addresses the underlying cognitive physiology of depression.

Yoga helps to improve social and neuro-cognition. There are some benefits to introducing yoga therapy early in the psychosis treatment process. Yoga may help people with schizophrenia by increasing oxytocin and stimulating the parasympathetic nervous system. Yoga has such profound neurobiological effects that psychiatrists can use it to provide their patients with all-encompassing care.(Karri et al., 2021). Some people have perception that “yoga is suitable only for people of a certain age”Nonetheless, yoga is accessible to all people, regardless of gender or age. All you need is commitment and consistent practice. Anyone can begin practicing at any age as long as they have the capable supervision of an instructor. It is well known that advanced asanas can be effortlessly and flawlessly executed by elderly individuals with proper instruction. Different techniques can also be taught to young children with ease. It is "practice" that renders a student "perfect."

**Working memory and working memory with children**

Working memory is a limited-capacity cognitive system that is involved in behaviour, reasoning, decision-making, and the temporary processing, manipulation, and storage of information. It also plays a role in learning and development. All executive functions may be supported by working memory, which is regarded as a component of the central executive function domain.

In fact, a wide range of cognitive tasks rely heavily on the working memory system, and assessments of fluid intelligence and working memory capacity differ significantly from one another. A helpful conceptualization of the subdomains of working memory distinguishes between two types of working memory: manipulation working memory, which involves manipulating and short-term storing of information relevant to a task, and maintenance working memory, which involves short-term information storage.(Brunner et al., 2017)

Childhood is when the ability to remember information for short periods of time dramatically increases. Increases in the temporary storage of speech-based content during the pre-school and adolescent years are indicative of intricate modifications in numerous component processes, such as perceptual analysis, memory trace construction and maintenance, order information retention, rehearsal, retrieval, and redintegration.(Gathercole, 1999)

Possible sources of age-related changes in working memory include increases in processing efficiency and attentional capacity, and task switching. Phonological and complex working memory systems play distinct roles in childhood knowledge acquisition, with phonological memory focusing on new word structures, and working memory supporting various learning contexts.(Gathercole, 1999)

**Yoga, Mindfulness and Cognition**

Yoga is derived from ancient Indian science, and now it has gained immense popularity as a physical practice and way of life in modern times. The three main components of the physical practice of yoga are dhyana (meditation), pranayama (breathing exercises), and asanas (postures). Devoted yoga practice yields tools to develop unwavering awareness (dhyana), bring the senses back (pratyahara), and focus the mind (dharana). Yoga is more than just stretching; it's about doing dynamic, breath-synchronized movements. yoga has been linked to several health advantages, such as improved physical endurance, equilibrium, flexibility, and relaxation. But thanks to mindfulness training, which combines meditation with the dynamic fusion of proprioceptive and interoceptive awareness, yoga also seems to have the potential to provide psychological benefits. Regular yoga practice produces both awareness and profound focus.(Brunner et al., 2017)

## 5. MATERIAL AND METHOD:

### 5.1 DESIGN

In the study, a quantitative framework was used. The dependent variable was measured once during the pre-test phase, which occurs before the intervention or
exposure, and the post-test period, which occurs after the exposure, in a pre-test-post-test design. The working memory of participants in the current study was evaluated both before and after the adoption of yoga practices. Experiences were documented both during and following yoga practice.

### 5.2 MEASURES

Two measures have been taken in this study: working memory and sociodemographic data.

- **Sociodemographic information**- At baseline, information on parental education, occupations and incomes was collected on a structured questionnaire administered to the mothers of the study participants.
- **Working memory**- In Digit Span (DS) subtest of the Wechsler Adult Intelligence Scale, Fourth Edition (WAIS-IV), working memory can be measured. The Digit Span Forward (DSF) test measures maintenance working memory by having the participant recall a series of numbers in the same order; Digit Span Backwards (DSB) measures higher-load manipulation working memory by having the participant recall the numbers in reverse order.

### 5.3 SAMPLE

Using a purposive sampling technique, 46 socioeconomically disadvantaged background students between the ages of 6 and 12 were chosen as study participants, 18 of whom were female and 28 of whom were male. The sample was created based on the inclusion and exclusion criteria.

- **Inclusion criteria-** Age group of 6 to 12 years and socioeconomically weaker background (annual income less than 2.5L of family).
- **Exclusion criteria-** Those who have any physical and psychological ailment, and age below 6 and above 12.

### 5.4 PROCEDURES

After obtaining authorization from the Bhavishya NGO, which is situated in the Noida district, students were selected for further consideration based on the inclusion and exclusion criteria. One group pre-test post-test of pre-experimental design has been used to conduct the pilot study on school going socioeconomically weaker background children. Prior to engaging in a yoga session, participants completed baseline assessments of their ability to manipulate and maintain working memory (DS) and up to eight weeks prior. Four weeks of one 60-minute yoga class every day. In a research assessment room, participants had individual meetings with the experimenter (DB) to complete a brief demographic questionnaire and receive the DS at time 1, which was completed prior to yoga sessions, and time 2, which was completed eight weeks after yoga sessions. During the period of 1 december2023 to 31 December 2023, the Bhavishya NGO hosted all yoga sessions on campus. The yoga sessions were taken by Harshi Garg, an authorised yoga instructor who has completed BSc. yoga science from UNIVERSITY OF PATANJALI and MSc. Yoga therapy from SVYASA UNIVERSITY.

#### 5.4.1YOGA INTERVENTION

The socioeconomically weaker background children participating in the yoga group received phased instruction in a variety of yoga poses over the course of two months. The yoga intervention was as follows:

(1) The yoga sessions began with gentle hand and leg flexions and extensions. The spine was then stretched dynamically through poses like side, forward, and backward bends, as well as tadasana (standing upright in the yoga pose). The sun salutation, or surya namaskara, entails stretching the hand, spine, and leg joints. It was taught and practiced at least five times.

(2) Asanas—postural exercise sessions—included triangle postures, veerasana (warrior posture), padahastasana (forward bend posture), chakrasana (wheel posture), sarvangasana (shoulder stand posture, head stand posture), halasana (plough posture), paschimothanasana (posterior stretching), padmasana (lotus posture), vajrasana (ankle posture), and ushtrasana (camel posture). The children were instructed to perform these exercises slowly, breathing in while initiating a posture, breathing out while bending, and then doing normal breathing for 10 seconds while maintaining the posture.

(3) Breathing practices included kapalabhati (rapid exhalations), ujjayi (breathing with a hissing sound), and pranayama.

(4) Due to the young age of the children, basic meditation techniques were taught, such as asking them to count backwards from 20 to 0 and closing the eyes during deep inhalations and exhalations. With their eyes closed, the kids managed to accomplish this with ease.

(5) Children were also taught Trataka (gazing at a burning candle kept on an elevated base) to increase concentration.

## 6. DISCUSSION:

Data has been extracted from the participants through Digit Memory Test. All the responses from all DMT have been collected in separate sheets. All the collected data has been scored manually according to the scoring rules of DMT.
Data was analysed using JASP software for both descriptive and inferential statistics.

· Data was assessed for Non normality distribution using the Wilcoxon sign rank test (a test of Non-normality).

· The scores recorded on first day as well as last day of one-month yoga practices.

Student" scores and responses were consolidated, statistically analysed and interpreted. The results show there is a significant improvement in working memory from pre-test to post-test for the entire sample. As we have checked mean through descriptive statistics, and the results shows the significant difference between pre-post DMT. For normality "Shapiro wilks test has been used", significant result has been found which shows deviation from normality. So here we apply Wilcoxon Sign rank test of non-parametric test.

## 7. ANALYSIS AND RESULT:

As DMT Data didn't pass normality test so here we apply Wilcoxon sign rank of Non-parametric test.so the data of pre and post are (74.978 ± 7.383) and (80.174 ± 7.224) respectively with the P VALUE OF ( <0.001 ).

**Table 1** shows the mean difference of both pre-test DMT and post-test DMT

**Descriptive Statistics (Table 1)**

| Descriptive Statistics | | |
|---|---|---|
| | **PRE- DMT** | **POST-DMT** |
| Valid | 46 | 46 |
| Missing | 0 | 0 |
| Mean | 74.978 | 80.174 |
| Std. Deviation | 7.383 | 7.224 |
| Minimum | 63.000 | 63.000 |
| Maximum | 91.000 | 96.000 |

**TABLE 2, Wilcoxon signed-rank test**

| | | | | | | 95% CI for Hodges-Lehmann Estimate | |
|---|---|---|---|---|---|---|---|
| **Measure 1** | | **Measure 2** | **W** | **df** | **p** | **Hodges-Lehmann Estimate** | **Lower** | **Upper** |
| PRE- DMT | - | POST-DMT | 0.000 | | < .001 | -5.500 | -6.000 | -5.000 |

*Note.* Wilcoxon signed-rank test.

**TABLE 3, Assumption Checks**

Assumption Checks

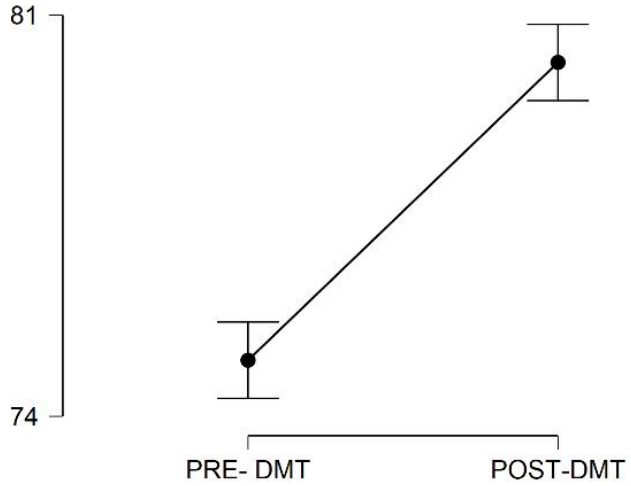
**Test of Normality (Shapiro-Wilk)**

| | | | **W** | **p** |
|---|---|---|---|---|
| PRE- DMT | - | POST-DMT | 0.843 | < .001 |

*Note.* Significant results suggest a deviation from normality.

**DESCRIPTIVE PLOTS**

**FIGURE-1, PRE- DMT - POST-DMT**




This descriptive plot shows the significant change in working memory before and after intervention of yogic practices. before intervention the value lies around 75 and after yogic intervention it reached to 81.

**SCATTER PLOTS**

**FIGURE 2, AGE - PRE- DMT**

This scatter plot shows the pre-DMT values according to age.

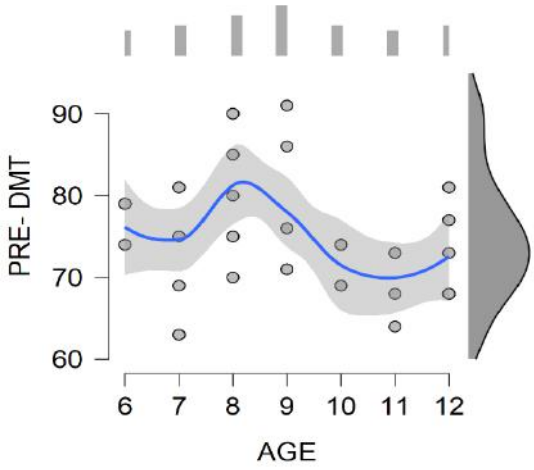



**FIGURE-3, AGE - POST-DMT**

This scatter plot shows the post-DMT values according to age.

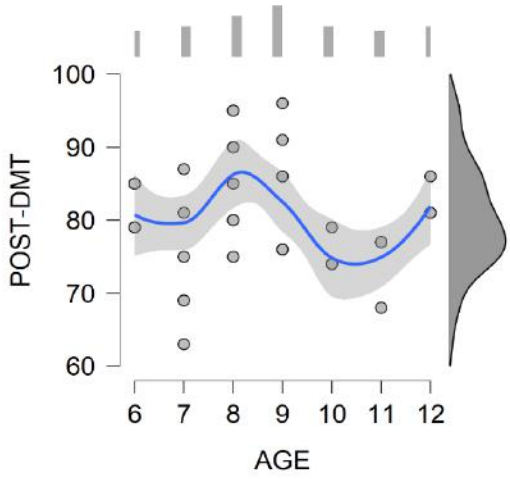



**FIGURE-4, PRE- DMT - POST-DMT**

This scatter plot shows the pre-post DMT values.

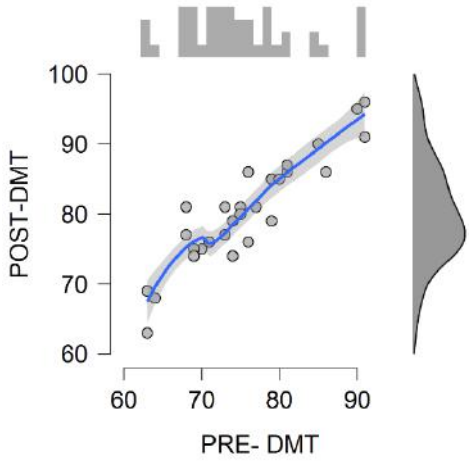
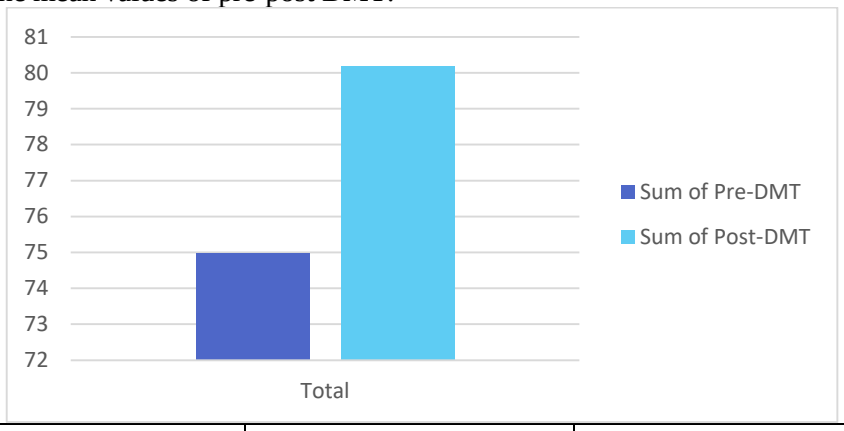



**FIGURE-5, Sum of Pre-Post DMT**

**Histogram**

This histogram shows the mean values of pre-post DMT.




| | PRE-DMT | POST-DMT |
|---|---|---|
| Mean Values | 74.978 | 80.174 |

## 8. FINDINGS:

The major findings resulting from the analysis are as follows:

- Children from low-income families have improved memory after engaging in yoga practices.

## 9. CONCLUSION / SUMMARY:

This study indicates that yogic practices improve the working memory of socioeconomically disadvantaged background students. This could be very beneficial for students since it could help them in academic related and learning processes. Yoga could be considered as an extracurricular activity to improve the overall cognitive functioning of students. It can be applied to students who have been secondary diagnosis due to academic related difficulties. The present findings could to applied at schools particularly. Schools can use this simple technique every day to improve the cognitive functioning of the students and to help students with academics and performance.

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