

CODING AND ITS IMPACT ON YOUNG MINDS

Author 1:

Name: Nachiket Kulkarni

Affiliation: Student

Department: Computer Science and Engineering

Institution: Shri Ramdeobaba College Of Engineering and Management

City: Nagpur

Pin-Code: 440022

Country: India

Author 2:

Name: Harsh Shrirame

Affiliation: Student

Department: Computer Science and Engineering

Institution: Shri Ramdeobaba College Of Engineering and Management

City: Nagpur

Pin-Code: 440034

Country: India

Author 3:

Name: Somya Ramani

Affiliation: Student

Department: Computer Science and Engineering

Institution: Shri Ramdeobaba College Of Engineering and Management

City: Bhalaghat

Pin-Code: 481001

Country: India

Author 4:

Name: Bhavesh Kewalramani

Affiliation: Student

Department: Computer Science and Engineering

Institution: Shri Ramdeobaba College Of Engineering and Management

City: Nagpur

Pin-Code: 440014

Country: India

Author 5:

Name: Monica Seth

Affiliation: Assistant Professor

Department: Humanities

Institution: Shri Ramdeobaba College Of Engineering and Management

City: Nagpur

Pin-Code: 440013

Country: India

ABSTRACT

In this technical world, everything requires a knowledge of coding. Learning to code is now the hobby of many young minds. It is important also because it trains them to face the future more confidently and bravely. As “Practice makes the man perfect” so it is important for the young minds to start their practice of coding as early as possible. Coding is all about the game played by brain. As “Rome was not built in day”, coding also requires great amount of time to develop one’s mind. Coding improves problem solving skills and this advantage lead to the birth of new education policies and rise of many websites which teach coding to young minds.

Keywords: Age, Children, Coding, Mind, Skills

Introduction

Coding, also called as computer programming, is the way of communicating with computers. The code we write gives instructions to a computer on what actions to take. By learning to write code, you can instruct computers to behave in a much faster way. You can use this skill to create websites, apps, etc. and do lots of other cool things.

Coding is mainly done using two types of programming languages:

- 1) **High-level languages:** These types of languages are easy to learn and understand. They can run on any platform. Some examples of high-level languages are C, C++, Java, Python, etc.
- 2) **Low-level languages:** These types of languages are difficult to understand and hardware knowledge is necessary to code using them. They are very machine-dependent. Some examples of low-level languages are machine language and assembly language.

Coding has proven to be quite beneficial in the past few years. The ability to code provides a new perspective to one’s problem-solving abilities. Research has shown that coding promotes logical thinking and increases a person’s creative thinking skills. Students who start coding from an early age have shown development in persistence and resilience. Some studies have also shown that learning to code can improve a child’s communication and math skills. There has also been a significant increase in demand for coding-related jobs. Coding can also be useful at jobs one might not expect. Many businessmen have said that coding helped them improve their business in many ways.

Research Methodology

To understand the different perspectives of people on this topic, we decided to conduct an online survey. As we, the authors of this research paper are currently pursuing our engineering degree from RCOEM, Nagpur, Maharashtra, we decided to share it in our college and our respective schools and got responses from teachers as well as students. We received a little over 100 responses and we used them to create various charts for better understanding. Our main focus was to see the views of people of different age groups on this topic and learn about their coding journey too.

Following steps were taken for undertaking the survey: -

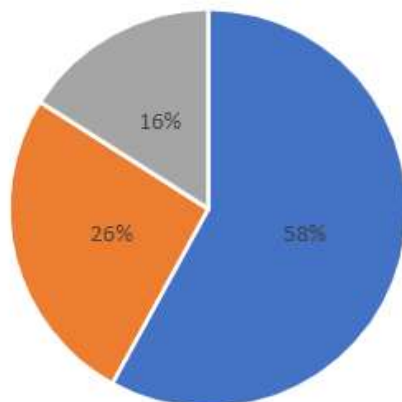
- We decided to reach out to the students and teachers from various schools and colleges for our survey.

- We created a Google form for our survey.
- We added different questions related to their coding journey and their views on our main topic. We asked them to give their honest opinion on this matter and tell us what they really feel.
- After the google form was created, we used various online sources like WhatsApp, Twitter, Telegram, Instagram, LinkedIn for reaching out to the students for responses.
- After collecting the responses, we analyzed the data with the help of pie charts, line, graphs, etc. which are some features provided by Google forms.

Result of survey

Q1) According to you what should be the appropriate age to start coding?

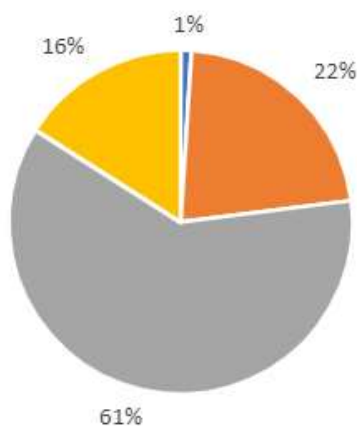
■ 8-12 years ■ 13-16 years ■ 17 years and above



More than half of the people suggested that students should start coding from an early age of 8-12 years.

Q2) When did you started your coding journey?

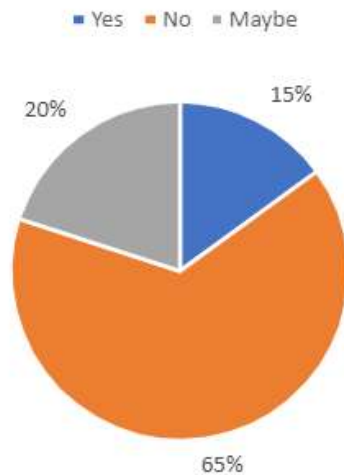
■ 8-12 years ■ 13-16 years ■ 17 years and above ■ Do not code



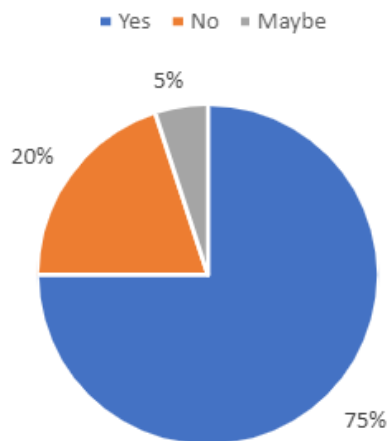
We learned that a huge percentage of them started coding after 17 years of age but almost every one of them stated in the subjective question that they would have liked to start earlier but couldn't as they did not know at that age

what coding was. Even though only 1% of them started at the age of 8-12 years, a lot of them stated that it would have been better if they had started from an early age too.

Q3) Do you think coding is too complex for the children under 12 years of age?

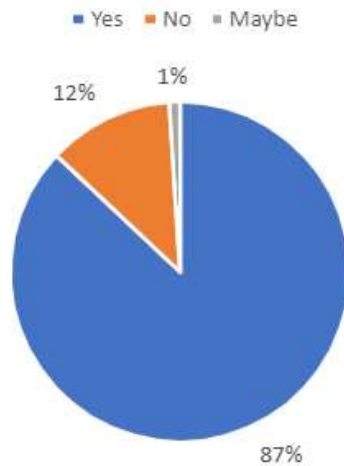


Q4) Do you think schools are doing right thing by adding coding subjects in their curriculum?



Majority of the people agreed that coding subjects should be added in the curriculum of schools. Even though some disagreed and said that it should be optional, even they thought teaching how to code in some basic languages would be beneficial.

Q5) Do you think coding improves creativity?



Almost everyone agreed to this and even shared some personal experiences.

This survey clearly brought out the views people had related to our topic. The ones who disagreed to some questions clearly stated why they had different perspectives and we were able to understand their arguments. This survey also helped us showcase ours and other student's views in this paper and gave us a clearer outlook on this topic.

Discussion

Why coding is important for children?

1. It helps children learn the technique of problem solving-
Coding helps in the development of mind. Coding helps children learn a skill of problem solving so that they can handle their own problems effectively without depending on anyone. It also helps them give them a chance to know how IT engineers and Software enthusiast handle the tough coding parts.
2. It helps them learn how to tackle a challenge and get flexible-
Coding problems become challenging as level goes up. Everything level of coding helps children learn something new and unique. Also, it helps them to gain more flexibility. They also learn that failure is good thing in one way as it helps them learn from their mistake which they can avoid in the future.
3. It enhances their creativity-
Coding helps children to build confidence. Once they become confident, the creative ideas start blooming in their mind. These creative ideas help them build something new which is their original work.
4. Computer Programming is the need of future-
Computer Programming is the future of the world. Almost everything requires the knowledge of programming. To develop programming skills, it requires practice and time. The early they start practicing, their skills will improve more with time.
5. Lack of eligible Programmers-
Another reason is the lack of the eligible programmers. Some programmers are not much aware of the problem that persist in the company. The reason is either they lack some skills of programming or they don't have much idea of the current situation. As many children start practicing the coding, the need of the programmers required in the future will get decreased.
6. Coding helps in the academics-
Coding helps in the improvement of academics of children .As mathematics is the required skill in coding and also most children have a Math Phobia, with coding their skill of mathematics will get improved.

How coding helps in the development of mind?

According to the studies done in 1991,1999,2005,2009,2012,2013 and 2017, Scientist found that coders had higher cognitive skills compared to others. Coding also improves brain health and neutral deterioration.

Another study was performed by the scientist of University of Passau, Germany Carnegie Mellon University, USA, Georgia Institute of Technology, USA, Leibniz Inst. for Neurobiology Magdeburg, Germany, Metop Research Institute, Magdeburg, Germany, University of Magdeburg, Germany.

These scientists performed the fMRI (Functional Magnetic Resonance Imaging) on the brain of the programmers. The results were based on

- **Middle frontal gyrus** responsible for attention, language, and memory
- **Middle temporal gyrus** responsible for semantics
- **Inferior parietal lobule** and **Inferior frontal gyrus** responsible for memory
- **Inferior frontal gyrus** responsible for language, and memory
- **Entire left hemisphere of the cerebral cortex** responsible for logic

Here is the image of how this process was conducted:

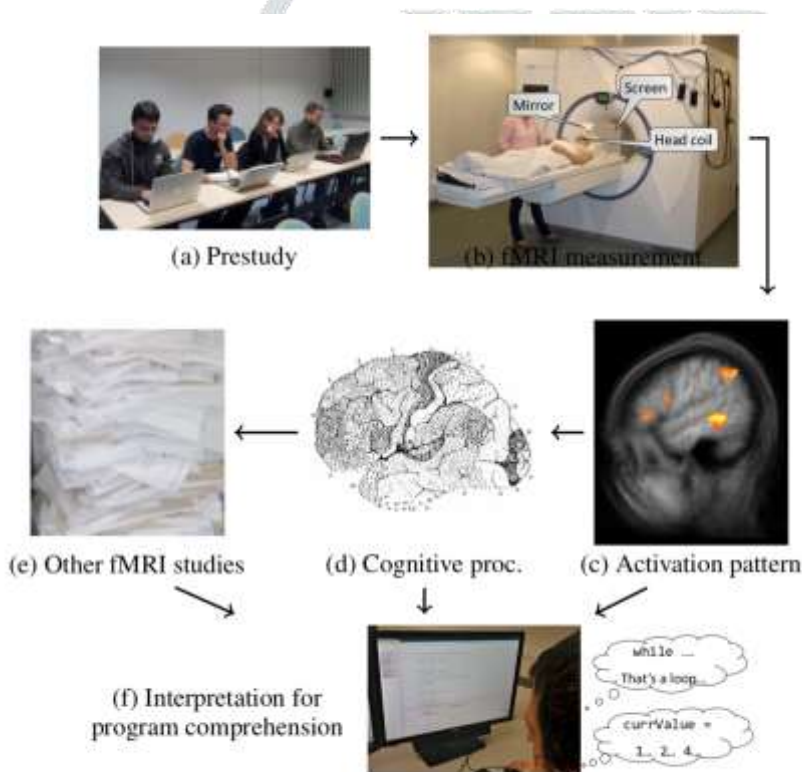
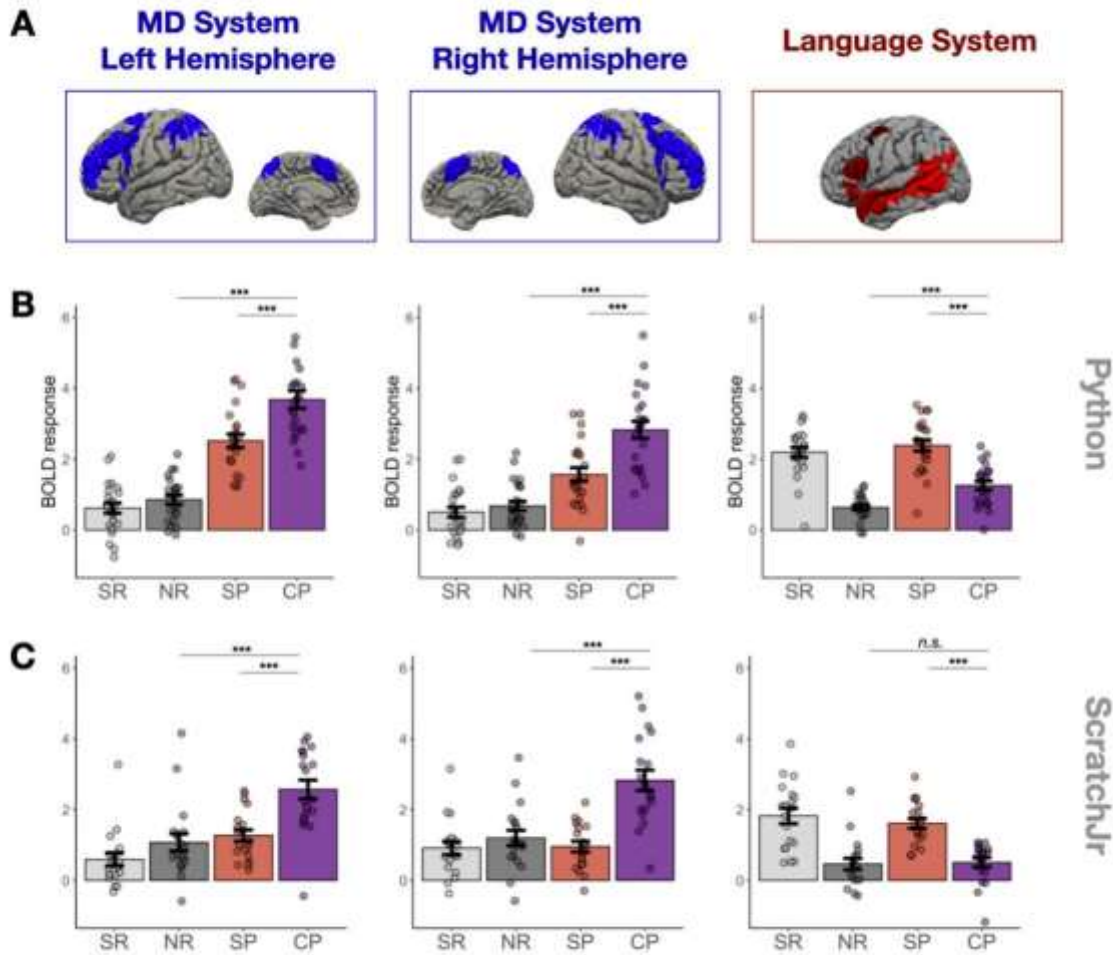


Figure 1: Workflow of our fMRI study.

They found difference between a programmer's brain and non-programmer's brain. They found that programmers' brain work totally in different direction. Their mind is always busy with the ideas of coding and this helps in the development of creativity. Programmers are able to handle multiple task at the same time quite effectively than others. They also found that once a programming language has been learned then it all depends on the brain which how the solution of the problem is being implemented. Also, the memory improves more when one solves the problem offline and then use the computer to execute it.



The above statistics shows the part of the brain most affected depending on the type of programming language one has learnt. It shows that the people who know python have higher and more improved brain levels than those who know ScratchJr.

This is how coding helps in the development of one's mind.

Now if the child starts learning to code at early age his memory will start becoming sharp. The parts of the brain discussed above will start developing with time and till the time he/she will be much more confident of getting a good job. The of decision making, facing the failures and problem solving skills will be much more better than those children who didn't started to code yet. It will raise the level of completion in a healthy way in the future. These coding lovers may start their own start-ups which will definitely lead to the increase in employment rates in a healthy way.

The government considering the above reasons came up with new policies in the education system.

New Education Policy 2020 (NEP)

The Ministry of Education has introduced New Education Policy that aims at introducing coding and increasing exposure to technology at early age, which will help them acquire important technical skills.

The New Education policy was approved by NDA government, the announcement was made at the press conference held by Education Ministry in the presence of Union Minister Prakash Javdekar and Ramesh Pokhriyal 'Nishank'. Anita Karwal, school education secretary, said that "students of class 6th and onwards will be taught coding as a part of 21st century skill".

According to NEP, having coding in the curriculum for students of 11 years or more will help them adapt to the future of technology. This will create a strong base for coding and help them to enter the world of technology. In the modern world of Artificial Intelligence, Neural Network and Robotics, communication with computers will be essential. Coding helps to enhance child's logical thinking, creativity, analytical thinking and can help them to make their future secure.

This initiative led to the rise of coding apps for children of age 10 years and above. Many applications are available on various platforms that aim at teaching coding in an innovative and easy way. Some of the applications are:

1. SCRATCH

It is the most popular coding application for teenagers and is used in many schools around the world. It is available on both Android as well as iOS. It uses visual implementations for better understanding and logic building. The website also contains various learning materials and guides.

2. KODABLE

This application has a game like approach where user has a character for to go from basic to advanced level of coding. It is available for free on both iPhone and iPad but not for Android. It focuses on various programming languages like HTML, CSS, JavaScript, Python, and Java and many more.

3. TYKNER

It is also a free coding application available on both web and iOS device. It has an online classroom like environment. It has option of teaching python for high school students. This application has various games and puzzles according to the concept. It also focuses on teaching Python and JavaScript. Tynker has its own community where people can have a look at other member's work.

4. WhiteHat Jr

It offers courses for children of age 6 years to 14 years. It is available for both Android and iOS devices. This application has researched curriculum and has one on one live coaching classes by experts. The curriculum includes developing games, applications, creating animations and much more.

Conclusion

Coding is the one of the way to develop the mind of the young ones. It can be taken as a hobby. The real use of coding comes into picture when one goes for solving higher practical problems. If one has a great practice of coding in a specific language then these problems go on becoming easier for them to solve. In today's world if any child has interest in coding then he can go for learning Object Oriented Programming. Object Oriented Programming are easy to learn and more over due to their better visual representation they will make children fall in love with them. Learning these coding languages will not only develop their mind and creativity but will also improve their problem solving skills which are much needed to cope up with real life problems.

Looking at these advantages, Government has decided to launch coding as a part of the academics from 6th standard. According to many parents and teachers, this decision is in the benefit of students. Today almost every field requires the knowledge of coding whether you be an engineer or an entrepreneur.

Whatever we see around exists due to coding. Coding is the need of the future generation which ensures the generation of high employment rates. It is better if one starts coding as early as possible.

References

1. *What is coding?* (2021). Grasshopper. <https://grasshopper.app/why-coding/>
2. *Types of Programming Languages*. (2012). Tyrocity. <https://tyrocity.com/topic/types-of-programming-languages/>
3. *Difference between high level and low level languages*. (2020). GeeksforGeeks. <https://www.geeksforgeeks.org/difference-between-high-level-and-low-level-languages/>
4. *Benefits of Coding*. (2018). WIZE Computing Academy. <https://www.wizeacademy.com/benefits-of-teaching-coding-to-kids-at-an-early-age/>
5. *10 benefits of coding beyond the computer*. (2018). Teach Your Kids Code. <https://teachyourkidscode.com/benefits-of-coding-beyond-the-computer/>
6. Today, E., 2021. *6 ways learning coding can boost your brain*. [online] India Today. Available at: <https://www.indiatoday.in/education-today/featurephilia/story/6-ways-learning-coding-can-boost-your-brain-1755775-2021-01-04>
7. Edology. 2021. *Why coding is the most important skill for an IT job | Edology*. [online] Available at: <https://www.edology.com/blog/computing-it/why-coding-is-so-important-for-it-jobs/>
8. Learning Resources Blog. 2021. *5 Reasons why Coding is Important for Young Minds - Learning Resources Blog*. [online] Available at: <https://blog.learningresources.com/5reasonskidscoding/>
9. Boing Boing. 2021. *Study finds brain-activity of people coding isn't quite like when they use language, or do math | Boing Boing*. [online] Available at: <https://boingboing.net/2020/12/30/study-finds-brain-activity-of-people-coding-isnt-quite-like-when-they-use-language-or-do-math.html>
10. Medium. 2021. *Coding is Good for your Brain*. [online] Available at: <https://medium.datadriveninvestor.com/coding-is-good-for-your-brain-e067063a493e>
11. G. (2020, August 1). *New Education Policy 2020: The change of perception in the Indian Education System from the schooling level*. The Financial Express. <https://www.financialexpress.com/education-2/new-education-policy-2020-nep-mhrd-ministry-of-education-coding-k-12-education/2041840/lite/>
12. Quint, T. (2020, July 30). *New Education Policy: Students To Learn Coding From Class 6*. TheQuint. <https://www.google.com/amp/s/www.thequint.com/amp/story/news/india/new-education-policy-students-to-learn-coding-from-class-6th-onwards>
13. Priyadarshini, M. (2020, July 30). *Indian Students To Learn Coding Skills From 10 Yrs Of Age: New Education Policy*. Fossbytes. <https://fossbytes.com/indian-students-to-learn-coding-skills-from-10-yrs-of-age-new-education-policy/amp/>
14. Desk, F. W. (2020, October 8). *What is WhiteHat Jr? Here's all you need to know about the edutech startup*. Free Press Journal. <https://www.google.com/amp/s/m.freepressjournal.in/article/business/what-is-whitehat-jr-heres-all-you-need-to-know-about-the-edutech-startup/57f4fd77-a6f6-4b94-83f4-f36b50e489df>