Teaching Application of EdTech Tools in Children's Programming Beginners: Take Microbit as an Example

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Abstract. In the post-epidemic era, education and technology are becoming more and more closely related. As technology continues to innovate, the use of scientific and technological software, artificial intelligence, etc. in education is becoming more and more widespread. This article analyses three aspects of education: parents, educational institutions and students, and offers advice and suggestions to educational institutions for improvement based on the views of students and parents. Parents are supportive of their children learning programming languages and are willing to allow their children to use technology in the classroom. However, parents still have concerns about the financial support needed and the negative effects (eye health, etc.) of using technology for their children. Students would like to be able to incorporate more interesting technology into their learning process as this would greatly increase their interest. Educational institutions also find the use of technology in the implementation of their curriculum. However, they still have concerns about investing money in it. We believe that technology plays a vital role in programming education and that if used correctly it can benefit students, parents and educational institutions alike.

Keywords: Education; Technology; Programming, Learning.

1. Introduction

The combination of technology and education is not immediately evident in online education, but can also be well demonstrated in classroom participation and classroom activation. As the present revolution in computer science enrollment is reigniting the demand for and significance of programming languages and contexts [1], the emphasis and relative objective necessity of providing computer science and programming to elementary school students in the country's educational progress [2]. However, most students and parents do not understand what programming is and what it means to learn it, so programming education has not taken off in the last few years. Even until these years, there are still many countries and cities that have not raised the status of programming education. Governments also do not promote programming education and do not have many well-developed relevant policies to reflect this, which directly leads to schools not taking computer technology courses seriously, resulting in students having a poor foundation in computing and struggling to stick with it even when some students choose to learn programming languages. In recent years, as most people have realised the importance of learning programming, a number of new educational tools have been created and used. Therefore, it is necessary to analyse the views of students, parents and educational institutions on the teaching of programming. It has also been shown that the application of science and technology has a proactive effect in supporting underrepresented students to study science and engineering fields [3]. Through this article, we can also find out how technology can be used to better support students' learning of programming languages. The aim of this study is to explore parents' expectations, satisfaction and recommendations towards the use of technology in programming education. then, to further understand the purpose, status and recommendations of using technology in educational institutions. Finally, the benefits and drawbacks of using technology in programming languages from the students' perspective are explored as well as related opinions.

2. Parents' Opinions towards Using EdTech Tools in Programming Education

2.1 Educational Expectation of Parents in Children's Programming Learning

The research conducted by Kong et al. showed that most parents believe there is a huge need to promote programming education in primary schools [4]. It is great for their children to study programming. They also believe that learning programming is important for their children's future. This shows that parents still recognize the positive impact of programming on their children. However, the experiment also showed that fewer parents were willing to take on the financial stress of learning programming for their children. Even if parents cannot support them financially, parents were still having high expectations of their children's education.

When parents were asked questions about programming content, parents were more likely to expect that their children's problem-solving skills would be improved. Parents also tend to work on their children's transferrable skills such as problem-solvingskills, communication skills and responsibility. This will allow children to get more exercise than just textbooks, but it also tends to put the cart before the horse and affect their academic performance. Fewer parents believe that programming education should be interdisciplinary. This may be due to the fact that parents are not sufficiently aware of the development of the subject and education, an idea that may prevent schools from bringing technology into the classroom thus affecting the efficiency and process of student learning. Even fewer parents expect programming language to be presented at school as an extracurricular activity. If parents also want the school to include programming skills as a curriculum activity, then the children will also take it to heart and be more willing to engage in learning.

In resource-limited settings, parents also show low aspirations for their kids and education institutes. This is because they worry that the lack of intellectual, physical and literacy resources will prevent them from providing support in the long term [5]. They fear that stopping halfway through a course will have more of a negative impact on the child than not learning.

Overall, parental thoughts and attitudes can greatly influence a child's set of behaviors. Plus, programming is an emerging subject, so it requires even more support and help from parents.

2.2 Parents' Satisfaction with the Use of EdTech Tools in Programming Teaching

Parents found the digital story telling (DST) activities interesting and engaging, which provided a positive change in learners' attitudes toward science instruction. This is a digital storytelling activity, where students use technology to tell their ideas. This creates a space for meaningful listening and an opportunity to digest information in a meaningful way. When considering the pedagogical benefits of the DST process, significant results can be shown from the perceptions of students and parents. The process of DST contributes to the development of student engagement and the effort achieved in the process, the acquisition of new knowledge and technical skills, and the personal and social development of learners. Although the experiment talks about the usage of DST activities in science teaching [6]. However, it is still reasonable to infer that parents also recognise the use of technology in programming.

The main points of parental dissatisfaction with their children's application of technology for learning are in the areas of health and efficiency. On the one hand, some parents believe that most technology requires a computer. Prolonged use or viewing of computers can strain children's eyes and even cause vision loss. On the other hand, parents are concerned that their children will not be able to control themselves and will use the technology to do things they should not do, such as play games or chat. This will also make children's learning less effective.

2.3 Parents' Suggestions on the use of EdTech Tools in Programming Teaching

Research conducted by Yu et al. also showed that 14 out of 18 parents expected that playing with programming tools would enable their children to understand coding and be more competent [7]. This is because they believed that programming would be an important skill for the future and see it as a second language that their children would need to acquire. Parents were unanimous in saying that

they wanted their children to use the kits in a meaningful way that was relevant and relevant, rather than passively watching the kit screens. Parents also want their children's creativity to be nurtured. Another common parental expectation is for their child to enjoy the coding kits. This group of parents want their kids to enjoy these games and regarding playing with the kits as a pleasure. Parents do not want their children to just use the technology for pointless clicking and browsing work, but rather to have the right activity or tool as a facilitator.

3. Opinions of the Educational Institution toward EdTech Tools in Programming Education

3.1 The Purpose of Educational Institutions Using Tools EdTech for Programming Teaching

Developing pupils' problem-solving skills is one of the most vital educational objectives of educational institutions. This will not only help them learn better in their present expertise but also help them learn and work better in the future [8]. Experiments have shown that students' problem-solving, studying programming, maths and science skills can be fostered through the use of robotics [8]. Also, as a student who is studying programming, a computer-related subject, the use of technology can help them understand more about the use of computers.

For some commercial educational institutions, the use of science and technology can also help them to make higher profits. At the same time, it can also enhance their promotional capital and give parents a good impression of their institution.

Second, the issue of equity is paramount when assessing the status of technology in education in schools [9]. Some reformers believe that technology can be the "only" educational change that can truly transform disadvantaged students beyond the boundaries of school [9]. This means that the usage of technology can assist underrepresented students to learn better. For example, if these students live far away from school then online classes can help them to cope with this problem.

3.2 The Current Status of the Application of EdTech Tools in Programming Educational Institutions

Different schools use different kinds of technology in education and study. Also, the age of students affects the application of technology. First, some teachers use kits to help students learn programming languages. This toolkit is fun and meaningful and maximizes student initiative. Second, some schools use robots to help students learn to program. This allows students to see in advance what they can expect from what they are learning, thus increasing their interest and confidence. There is not enough research on the use of technology in programming courses. However, we can still refer to the use in marketing education [10], where the use of technology has been well received by many.

There are commercial organisations that use the various features on the Microbit website to aid teaching. The site is comprehensive and also has a number of introductory tutorials that teach students to program step-by-step in three sections: thinking, structure and patterns. Some schools also use block, which is a game-based programmable robotics application. It is more fun than Microbit, but can be a little more difficult for beginners. The software is more flexible than the science and technology in schools. It is difficult to make full use of some of the assistive software available in the community because schools are restricted by policies that require them to be responsible for the privacy and physical and mental well-being of their students.

3.3 Programming Educational Institutions' Suggestion of EdTech Tools

There are many ideas about the use of technology in schools [11]. Some teachers indicate that despite the application of technology, there is a high rate of student attrition in online classes. Therefore, teachers suggested that the use of technology should be a priority to reduce student attrition so that students can better benefit from it.

Artificial intelligence can also be used in education. It can help students to learn not only visually and auditorily, but also to feel and imitate tactile and body language. As a result, many educational institutions are now using artificial intelligence in their teaching. This may be less common in public schools, as the investment in AI requires huge amounts of money and is often difficult for public schools to obtain. Then, there is the use of technology in providing feedback to students. This was suggested because shared documents provide a convenient platform for students to conduct peer reviews and for teachers to provide feedback on student work in a more accessible and comprehensive manner. Any confidence through the internet is remembered. Therefore, assessments made through science and technology can be retained for a long time and students can go through them at any time for a reflective summary if they wish.

4. Students' Opinions towards Technology in Programming Education

4.1 The Advantages of Using EdTech Tools in Programming Learning

The use of technology enables students to practice and improve their language communication skills [11]. For example, while on the online course, they were able to learn how to use a more polite way of answering the phone, which led to an improvement in their communication. At the same time, online communication is more limited, which means that students have to express themselves fully in a more restricted environment. In this way, the student‘s communication skills are also honed. Secondly, Through technology, students are able to exercise and acquire many essential abilities such as working collaboratively, cognitive skills, confidence, awareness and space understanding [12]. It also enhances meaningful learning, allowing students to learn not only to program but also to learn [13]. This is widely recognised because it is understood that the training of children in school should not be limited to their intellectual learning, but should also focus on developing their lifelong learning skills. Once they have mastered how to use science and technology, they will have an additional path to explore knowledge and discover answers.

4.2 The Disadvantages of Using EdTech Tools in Programming Learning

There are drawbacks to integrating technology in education institutes, such as huge start-up costs, copyright issues, offensive materials and other possible technological drawbacks, and there has been a great amount of research into the effectiveness of technology integration and better strategies. Students' ability to do their own writing also decreases. For example, when students use technology or website such as microbit to code, they cannot write by hand or correct spelling errors themselves due to the function of automatic calibration. Laptops are great for students, but when students take the real test, they sometimes can't find the spelling [13].

Students also felt that the use of technology sometimes distracted them from the classroom. Most technology has many features that allow students to understand the textbook more vividly. However, if there are too many interactions on a page, students often do not know which one to interact with or interact with a particular feature for a long time, thus delaying the normal flow of learning. For example, if a student is unable to answer the first question in the shortest possible time, then the student may be immersed in the first question when the teacher has already started the next one, which makes it difficult for the student to follow the rest of the lesson. Another distraction is the excessive use of pictures and animations. When students become curious about pictures or animations in technology, they unconsciously focus more on what interests them or appeals to them, thus affecting their learning efficiency.

Of course, students also raised concerns about their eyesight. If science and technology is used in teaching, then there is a high likelihood that students will also need technology when completing after-school work. However, most technology relies on electronic devices, electronic screens, etc. If students use these for long periods of time then their eyesight and eye health will also be affected. The effects are likely to be lifelong, so students continue to take this issue seriously.

4.3 Students' Suggestions for Using EdTech Tools in Programming Teaching

The students felt that they liked the use of technology in programming courses, first of all, because it made them more interested in the class. Moreover, as a worker, the relationship with techno is closely related. Some students also said that using technology sometimes distracts them. This shows that students also have some unique views on how to use science and technology in their programming courses.

The students felt that the school should expand the scope of the EdTech software so that it can be used in a variety of subjects. This would invariably build children's resilience and help them to engage with new subjects more quickly. For example, technology can be a great way to introduce students to a new world when they are learning an obscure subject for the first time. Particularly in STEM courses and engineering subjects, the use of science and technology not only develops their professional skills but also their ability to look ahead and understand information that is relevant to the field they will be entering.

Students also want software developers to design more interesting software with games to make it less complex and easier for students to use. Students will only be interested if the software is interesting. When students are interested, they will pay attention. They will learn more effectively when they are focused. More interesting software also makes children want to use it for a longer period of time, so parents, companies, schools and technology companies all benefit. In fact, fun and novelty are both the result of innovation, so even though it is already a high-tech use, innovation is still needed to drive overall development.

In response to the teachers, the students also felt that it would be more beneficial for them to make the most of the relevant science and technology if the teachers could provide a thorough explanation of the software before the lesson. From my own experience, I would agree with this. Firstly, if students are not flexible enough to use the software, then they will avoid using it as much as possible, which is counterproductive. That said, if students are proficient in using the software and the website, this will allow the technology to be used to its full potential. If they are not fully explained and left to their own devices, their initiative will be greatly reduced.

5. Conclusion

The learning of programming languages has an invaluable role in developing and increasing the number of highly skilled people. The computer industry is also currently facing difficulties in enrolling students. Due to the rising popularity and necessity of programming languages, it becomes necessary for students, parents and educational institutions to explore the learning aspect of programming languages. This article explores the impact of educational science and technology in programming education from a total of three perspectives. From a parent's perspective, expectations, satisfaction and recommendations are presented in this article. From the perspective of the educational institution, aims, status and recommendations are also discussed. From the student's point of view, the benefits, disadvantages and recommendations are also presented. Through this article we have found that most parents of students as well as educational institutions have a positive opinion of teaching programming languages. However, parents' thoughts are still influenced by their financial means. From the students' point of view, they prefer that even if they use science and technology to learn programming languages, they do so in a way that is fun so that they want to keep learning. Educational institutions also recognise the role that science and technology can play in programming learning, but there are concerns about the financial implications of using science and technology.

Through the analysis in this article, we provide a reference in terms of public opinion in children's programming education. This will allow students to have a more humane classroom setting, parents to feel more comfortable with their children learning programming, and educational institutions to reap the maximum benefits while doing a good job. What is more, the growing interest in diversity, inclusiveness and equality in education today is placing greater demands on educational technology. Future research could focus on how to help students make better use of technology in programming

and also explore how commercial organisations can maximise the benefits of providing a good education to students.

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