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WAYS OF FORMING STUDENTS' DIGITAL COMPETENCE IN COMPUTER SCIENCE CLASSES

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Abstract

The most important condition that the modern information society puts forward for the school is the competitiveness of the graduate, his acquisition of such qualities as independent, critical and creative thinking; the ability to competently work with because today this is one of the most important factors of a young person's success. Therefore, general educational institutions should form in students the ability to learn, find information, critically evaluate it and creatively use it, that is, form digital competence in students, which in the future will provide them with the opportunity to study successfully throughout their lives; prepare for the chosen professional activity and constantly improve one's professional qualifications; to live and work in the information society, in the conditions of the technological economy. Digital competence is a vital skill in today's digital era, where technology is an integral part of our lives. The importance of digital competence has increased even further in the current global pandemic situation, where digital literacy has become essential for continuing education and working remotely. Therefore, computer science classes play a crucial role in fostering students' digital competence. In this article, we will explore different ways of forming students' digital competence in computer science classes.

Keywords: competence, digital competence, digital literacy, information technologies, computer science lesson

Introduction

Digital competence refers to the ability to use digital technologies effectively and responsibly to achieve personal, social, and professional goals. Computer science classes provide an excellent opportunity for students to learn and develop digital competence. However, it is not enough to teach students just how to use digital tools; they also need to learn how to use them responsibly and safely.

The European Commission has defined eight key digital competencies that are considered essential for individuals to participate fully in a digital society. These competencies are often referred to as the "DigComp" framework. Information and data literacy: This competence includes the ability to search for, locate, and evaluate information using digital tools. It also involves the ability to use data effectively and ethically. Communication and collaboration: This competence involves using digital tools to communicate and collaborate with others. It includes skills such as online etiquette, digital communication, and teamwork. Digital content creation: This competence involves the ability to create and edit digital content using a range of tools and formats. It includes skills such as multimedia production, graphic design, and coding. Safety: This competence involves being aware of the risks and threats associated with digital technology, and knowing how to protect oneself and others from them. It includes skills such as online privacy, cyber security, and safe browsing. Problem-solving: This competence involves using digital tools to solve problems and make decisions. It includes skills such as critical thinking, analytical reasoning, and creativity. Career-related: This competence includes the ability to use digital tools to find, apply for, and manage jobs. It also involves knowing how to use digital tools to develop one's career and professional skills. Learning: This competence involves using digital tools to support learning and personal development. It includes skills such as e-learning, online courses, and digital self-assessment. Active citizenship: This competence involves using digital tools to participate in social and civic activities. It includes skills such as digital activism, online voting, and digital volunteering. (Dubov, 2010, p.64)

These eight digital competences are designed to provide a comprehensive framework for individuals to develop their digital skills and knowledge. They are also used by educational institutions and employers to design digital literacy programs and job training courses.

Ways of forming students' digital competence in computer science classes

Let's consider some recommendations that will help to form the digital competence of students.

Digital citizenship involves teaching students about their rights and responsibilities when using digital technologies. Computer science classes should focus on imparting these skills, such as understanding online privacy, creating and maintaining a positive digital footprint, and avoiding cyber bullying. Teachers can use case studies and real-life examples to teach students about the consequences of irresponsible digital behavior. It is also important to teach students about online security and safety. Teachers can provide tips and guidelines for students to follow, such as using strong passwords, avoiding phishing scams, and keeping their personal information private. Students should also be taught about the dangers of sharing personal information online and how to identify and report online abuse. (Genseruk, 2019, p.8-16)

Encouraging students to be creative with digital technologies can help develop their digital competence. Computer science classes should incorporate activities that challenge students to use digital tools in innovative ways, such as creating websites, animations, or games. Teachers can provide opportunities for students to explore different digital tools and experiment with their features. In addition to creativity, it is important to teach students about digital design principles. Students should learn about user interface design, visual design, and typography. These skills will help students to create digital products that are easy to use and visually appealing.

Collaborative learning helps students to develop communication and teamwork skills, which are crucial in the digital age. Computer science classes should encourage group projects that require students to work together on digital projects and communicate effectively. Teachers can use group projects to teach students about project management, task delegation, and conflict resolution. Collaborative learning also provides students with an opportunity to learn from each other. Students can share their knowledge and expertise, and learn from the different perspectives and approaches of their peers. (Litvynova, 2016, p.354)

Introducing coding at an early age can help students develop computational thinking, problem-solving skills, and logical reasoning abilities. Computer science classes should include coding exercises to teach students how to think logically and solve problems using technology. Teachers can use visual programming languages such as Scratch or Code.org to teach students the basics of coding. In addition to coding, students should also learn about algorithms, data structures, and programming concepts. These skills will help students to understand how technology works and how to create their own digital products.

Practice is essential for developing digital competence. Computer science classes should provide opportunities for students to practice using digital tools and receive feedback to improve their skills continually. Teachers can provide formative assessments and constructive feedback to help students understand their strengths and weaknesses. It is also essential to provide students with opportunities to apply their digital skills outside of the classroom. Teachers can encourage students to participate in coding competitions, hackathons, and other digital events.(Golovan, 2008, p.23-30)

By focusing on digital citizenship, encouraging creativity, promoting collaborative learning, introducing coding, and providing practice and feedback, teachers can help students develop the skills they need to navigate the digital world safely and effectively. These skills will prepare students for a future where digital technologies will play an increasingly important role in every aspect of their lives.

Integrating digital competences into subject teaching can enhance students' learning experiences and equip them with essential skills for the digital age. Here are some digital competences that subject teachers may develop when integrating subjects.

Digital literacy involves the ability to use digital tools and technologies to find, evaluate, and communicate information effectively. Teachers who integrate digital technologies into their teaching can help students develop

digital literacy skills, such as using search engines, social media, and digital libraries to access information related to the subject matter.

Digital communication involves the ability to use digital technologies to communicate effectively with others. Teachers can use various digital tools, such as online discussion forums, chat rooms, and video conferencing, to facilitate communication among students and between students and teachers. This can help students develop digital communication skills, such as how to express themselves clearly and appropriately in various digital contexts. (Hrytsenchuk, 2019, p.129-134)

Data literacy involves the ability to use digital tools and technologies to collect, analyze, and interpret data. Teachers can integrate data analysis tools and technologies into their teaching, such as spreadsheets and data visualization software, to help students develop data literacy skills. This can help students understand how to collect and analyze data related to the subject matter and draw meaningful conclusions.

Collaboration and teamwork involve the ability to work effectively with others to achieve common goals. Teachers who integrate digital tools and technologies into their teaching can provide opportunities for students to work collaboratively on digital projects. This can help students develop collaboration and teamwork skills, such as how to communicate and work effectively with others in online environments.

Digital creativity involves the ability to use digital tools and technologies to create and produce new content. Teachers who integrate digital tools and technologies into their teaching can provide opportunities for students to create digital content related to the subject matter. This can help students develop digital creativity skills, such as how to use digital tools and technologies to design and produce creative content. (Galatyuk, 2011, p.21-26; Lytvinova, 2016, p.354)

Overall, integrating digital competences into subject teaching can help students develop essential skills for the digital age and enhance their learning experiences.

In order to successfully develop digital competence in students, it is advisable to pay attention to our recommendations. Introduce students to programming languages: Teach students programming languages like Python, Java, C++, or HTML/CSS, as these are foundational skills that are essential in the digital world. Offer hands-on opportunities for students to experiment with digital tools and platforms, such as creating websites, designing mobile apps, or building games. Encourage students to work together in groups or pairs, and provide opportunities for them to share their knowledge and expertise with one another. This fosters a collaborative learning environment that is conducive to the development of digital competence. Use game-based learning techniques to teach coding concepts, algorithms, and programming logic. This can make learning more engaging and interactive for students. Assign projects that require students to use digital tools and technologies to solve real-world problems or create practical applications. (Bykov, 2011, p.8-13) This approach helps students see the relevance and applicability of digital competence in their daily lives. Incorporate multimedia resources such as videos, interactive tutorials, and simulations to help students understand complex digital concepts. Educate students about the importance of online safety and privacy, and how to protect themselves from cyber threats, including phishing, hacking, and identity theft. Help students develop digital literacy skills such as information literacy, media literacy, and digital citizenship, which are important for navigating the digital world. Encourage students to use digital tools to express their creativity, such as creating digital art, music, or videos. This helps them develop their digital skills while also fostering their creativity. Provide ongoing support and resources to help students continue developing their digital competence, even after the class has ended. This may include access to online tutorials, digital tools, and networking opportunities. (Kosharuk, 2016)

Digital skills are becoming increasingly important in today's world, and Ukraine is no exception. Computer science classes can play a significant role in developing these skills among students. In recent years, Ukraine has made significant efforts to promote digital skills in its education system. The Ministry of Education and Science of Ukraine has included digital literacy as one of the key competencies that students must develop. This includes proficiency in using digital devices and software, as well as understanding the ethical, legal, and social issues related to the use of technology.

Computer science classes in Ukraine are designed to provide students with a strong foundation in computer programming, algorithm development, and problem-solving skills. These classes can help students develop digital skills by teaching them how to use programming languages, software development tools, and other digital technologies. Furthermore, the government of Ukraine has launched several initiatives to promote digital skills among students. For example, the "New Ukrainian School" project, which aims to modernize the education system in Ukraine, includes a focus on developing digital skills. This project includes the creation of new computer science curricula, the development of digital resources and tools for teachers and students, and the provision of training programs for teachers to help them incorporate digital skills into their classes. Additionally, the Ukrainian government has launched various programs and initiatives to support the development of digital skills. For example, the "Digital Skills for Ukraine" program aims to provide training and support to individuals, businesses, and the government to help them improve their digital skills. The program offers a range of courses and workshops, including coding, data analysis, and cybersecurity. Another initiative is the "Code Club Ukraine" program, which aims to teach coding skills to children aged 9-13. The program is run by volunteers and offers free coding classes in schools and community centers across Ukraine. (Koneshchynska, 2018; Vlasii, 2017, p.117-122)

In addition to these initiatives, Ukraine has a vibrant tech industry, which provides students with opportunities to gain practical experience and develop their digital skills. Many tech companies offer internships and apprenticeships to students, providing them with hands-on experience working with digital technologies.

In Ukraine, the ways of forming students' digital competence in computer science classes typically involve a combination of theoretical and practical approaches. The Ukrainian curriculum for computer science classes is designed to teach students the fundamentals of computing, programming, and digital literacy. The curriculum is designed to be age-appropriate and is updated regularly to reflect the latest trends and developments in the field. Students are often given practical assignments to work on, which require them to use their digital skills to solve problems. (Kartashova, 2020) This approach helps students to develop their critical thinking and problem-solving abilities. Computer science classes in Ukraine often use interactive learning tools such as multimedia presentations, videos, and animations to engage students and make learning more fun and interactive. Ukrainian computer science classes often make use of online resources such as educational websites, online forums, and virtual learning environments to supplement their teaching materials and help students stay up-to-date with the latest developments in the field. To encourage students to take an active interest in computer science, schools and universities in Ukraine often organize coding contests and hackathons. (Lyashenko, 2015, p.173-177). These events allow students to showcase their skills, learn from their peers, and gain valuable experience working on real-world problems. Overall, the focus of computer science classes in Ukraine is on developing students' digital literacy and problem-solving skills, as well as their ability to work collaboratively and think creatively. Computer science classes in Ukraine are playing an important role in the development of digital skills among students. The government's efforts to promote digital literacy and the country's growing tech industry provide students with a range of opportunities to gain practical experience and develop their digital skills. (Ovcharuk, 2004, p.112)

Conclusions

Integrating technology into the curriculum can improve students' digital competence. This includes using digital tools to enhance learning and allowing students to use technology to create their own projects. Creating a collaborative and supportive environment can help students feel comfortable using technology and allow them to learn from each other. Providing students with opportunities to engage in hands-on learning activities, such as coding projects, can help develop their digital competence. Encouraging students to take ownership of their learning and explore technology independently can lead to greater development of digital competence. Providing teachers with professional development opportunities can help them stay up-to-date with the latest technology and teaching methods, which can in turn benefit their students' digital competence. Ensuring that all students have access to technology, regardless of their background or socioeconomic status, is crucial for developing digital competence. Schools should work to provide equal access to technology for all students. Overall, the research suggests that developing students' digital competence requires a combination of technology integration, a supportive classroom environment, hands-on experience, self-directed learning, teacher professional development, and equal access to technology.

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