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Self-learning in the digital age: insights from high SES primary school students in Türkiye and Azerbaijan

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ABSTRACT

This study examines the self-learning sources and practices of 10–11-year-old primary school students from high socioeconomic backgrounds in Türkiye and Azerbaijan. Through semi-structured interviews with students and parents ($n = 26$), the research explores self-learning diversification and strategies in the digital age. Findings reveal that self-learning experiences do not differ significantly between the two countries. Both digital and physical resources are integral to students' learning efforts. While there is a shift from print materials towards the internet, family and peers maintain their traditional significance, providing crucial support for students' self-learning processes. Emotions play a key role in navigating the self-learning journey, where challenges such as managing the abundance of online information and avoiding inappropriate content persist. Family dynamics exhibit a spectrum of support, including both direct interaction and digital engagement. The research highlights the crucial roles of self-regulation, digital resources, and familial and peer support in fostering learning achievement among these students.

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Introduction

Traditionally, learning has been confined to academic settings under the guidance of educators, constrained by a prescribed curriculum. It has often relied on the passive reception of educational material, culminating in assessments such as written tests (Gibbons et al. 1980). However, the concept of learning extends past these boundaries, encompassing the independent exploration of subjects that captivate individual interest beyond structured courses. Consequently, this capacity for self-directed learning facilitates the expansion of the educational journey, incorporating strategies that empower learners to seek and assimilate new knowledge autonomously.

In the wake of the twenty-first century, and further exacerbated by the post-pandemic landscape, there is a discernible shift in educational policy and practice towards models that prioritise learner autonomy, such as flipped and blended learning, and a commitment to lifelong learning principles (Daşcı Sönmez and Cemaloğlu 2021; Demiralay and Karataş 2014; Samancı and Ocakcı 2017). These innovative models challenge the foundations of traditional schooling by capitalising on technological advancements and the abundance of information resources now accessible to students. Consequently, students can, in many respects, independently cultivate knowledge from various settings – ranging from their homes to informal environments enabled by mobile and digital platforms. For example, today, a student intrigued by marine biology may bypass traditional educational pathways to directly engage with experts and utilise online resources to fuel their learning (McDiarmid and

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Zhao 2023). These emerging tools and strategies significantly contribute to self-learning practices among individuals.

To better understand and analyze self-learning practices in the twenty-first century, it is essential first to examine how individuals process learning and information. With this foundational understanding established, we can then explore the various twenty-first-century environments where learning occurs and the methods employed.

Learning and human information processing

Learning involves complex interactions between the learner, the material, and others, with communication shaping these experiences (Okkalı 2008). Different theories define learning in various ways: cognitive theory sees it as internal mental processes creating meaning, behaviourist theory views it as a bond between stimulus and behaviour (Aydın 2000), and neurophysiological theory considers it a biochemical process (Özden 2003). Sweller and Sweller (2006) describe learning as information processing that changes long-term memory, similar to genomic changes in evolution. Learning involves changes in synapses, leading to new knowledge acquisition (Keleş and Çepni 2006). Essentially, learning can be defined as the production and use of new information through the processing of external and existing knowledge.

Human information processing, a key learning model, involves using auditory, visual, and tactile input channels to drive perception, attention, and comprehension from sensory memory to long-term memory (Larsen et al. 2024).

As depicted in Figure 1, memory, which is essential for learning, comprises three types: sensory, short-term, and long-term. Sensory memory briefly registers inputs, which then move to short-term memory for processing. Information that is rehearsed is encoded into long-term memory for later recall (Casey and Kelly 2019). Long-term memory stores information using schemas for easy recall (Çağıran Gülten, Ergin, and Avcı 2009). Without reinforcement, neuronal connections weaken, leading to forgetting (Korkmaz and Mahiroğlu 2007).

Learning at school, home, and online

Learning in the brain is a biological process influenced by events and experiences in an individual's immediate environment. Within their social contexts, schools guide students toward new forms of learning that align with society's contemporary and institutional needs. The traditional factory line, or one-size-fits-all approach, worked well when the goal of education was to process large groups uniformly through standardised learning within a specific timeframe. However, today's

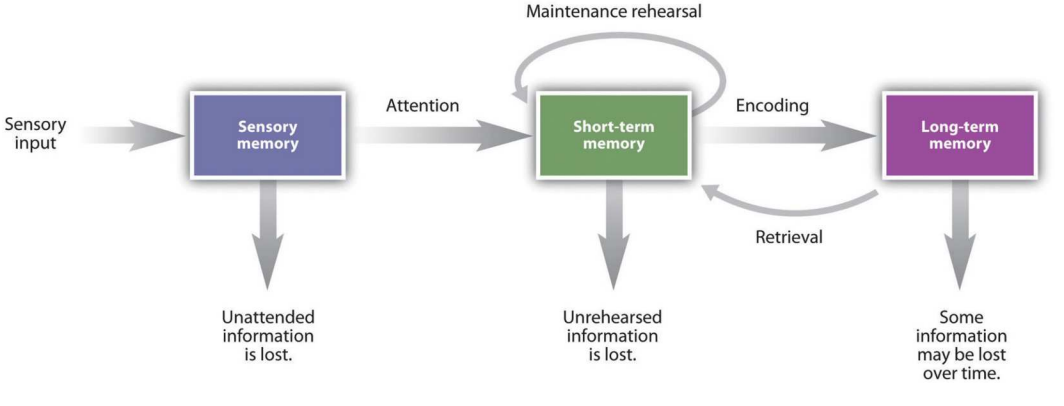

Figure 1. Learning and memory (Stangor and Walinga 2010).

challenge lies in the fact that while our educational systems are still deeply rooted in these outdated methods, the future demands more personalised and tailored educational experiences (Cross 2005).

The traditional paradigm of education, characterised by classroom-based instruction and teacher-led learning, is being challenged by the proliferation of online resources and the growing emphasis on student-centered approaches. Learning outside the classroom is distinct in format from traditional school settings. Consequently, families, individuals, and governments opt for different approaches to foster personal and societal progress, ranging from traditional schooling to home-schooling and more personalised options (Ripperger-Suhler 2016).

Most individuals spend their early lives at home and school within their social environment. Additionally, the internet has become a significant source of learning, emphasising the importance of students developing meta-skills to master and navigate their own learning. Standard teaching and curricula in schools may not suffice for the job market or individual needs. In this context, independent learning and pedagogies that aim to foster learner autonomy are growing in importance (Lau 2017), a topic generally discussed in higher education settings (Hockings et al. 2018; Jackson and Shenton 2010; Silverajah and Govindaraj 2017). In primary education, independent or self-learning has typically been addressed either as a standalone concept or within the scope of self-regulated learning.

Self-regulated learning

The turn of the millennium witnessed a burgeoning interest in self-regulated learning for students at the primary school level (Dignath, Buettner, and Langfeldt 2008). Today, self-regulated learning is considered one of the most important competencies for becoming a lifelong learner (de Ruig, de Jong, and Zee 2023). It is a process by which individuals control their emotions, behaviours, and cognition to determine their own learning strategies (Panadero and Alonso-Tapia 2014; Zimmerman 2000). Self-regulated learners possess the ability and motivation to reflect on how, what, and why they are learning (i.e. metacognition), thereby exerting control over their learning behaviour (i.e. self-regulation) (van Alten et al. 2020).

In self-regulated learning, individuals are aware of how they learn and thus make positive academic contributions to their educational journey (Aydın and Atalay 2015; Kayıran and Doğanay 2017). Given that online sources can offer more than what traditional schools and teachers can provide, school leaders should prioritise self-regulated learning in their digital age education plans. Instead of solely allocating further physical resources to schools, an alternative approach could involve fostering students' self-regulated habits, enabling them to maximise their learning potential through options such as mobile memberships and a wide selection of online tutors.

Purpose of the study

The twenty-first century has introduced new teaching strategies such as flipped learning, the emergence of profiles like the self-regulated lifelong learner, and the proliferation of learning options both online and outside traditional school environments. These developments have brought new agendas to the forefront of educational discourse. As schools accustomed to traditional lecture-based teaching methods encounter an increasing number of students employing self-directed learning strategies and online learning sources, this study aims to investigate how students at primary education levels learn at home and in non-school environments by themselves or with their peers. Additionally, the research explores where and how students acquire knowledge on new topics and self-direct their learning journey, particularly concerning subjects they are most passionate about.

Method

This qualitative research employs a case study design to investigate the self-learning strategies and resources utilised by primary school students at home and outside of school. The case study method was chosen to provide a detailed examination of the processes and behaviours within their real-life context (Tellis 1997). This design facilitated an in-depth understanding of the individual and collective practices of self-learning among the students. The researchers aimed to understand the self-directed learning process in terms of both individual and group dynamics, offering insights into how these students manage and navigate their learning experiences outside the traditional classroom setting.

Sample

The participants consisted of fourth and fifth-grade students, along with their parents, from two private schools located in Baku/Azerbaijan and Istanbul/Türkiye, during 2023-2024 academic year. These students came from families with high socioeconomic status (SES), with each student having access to digital devices such as tablets and computers at home. The schools were selected based on convenience sampling, as the researchers aimed to gather rich data from institutions where they had established cooperation and could access continuous information.

The student participants in these two schools were invited based on specific criteria, including age, access to technology, and willingness to participate. Consent was obtained from parents, students, and their teachers. Participants in the study were coded using identifiers, such as P1, P2, etc. for student participants and Pa1, Pa2, etc. for their parents, respectively.

As Table 1 displays, the study involved thirteen fourth and fifth-grade students aged 10–11 years from the schools in Baku and İstanbul, the largest cities in Azerbaijan and Türkiye, respectively. The total number of participants, including the students' parents, was 26. The parents, aged between 32 and 43, comprised eleven mothers and two fathers. The ten-year-old students were fourth graders in elementary schools, while the eleven-year-old students were fifth graders in secondary schools. Both groups were labelled as primary education groups.

The schools are located in metropolitan areas and cater to both countries' elementary and secondary school levels. While Türkiye and Azerbaijan are neighbouring countries with shared cultural and historical ties, and both belong to the Oghuz branch of the Turkic languages (Sağın-Şimşek and König 2012), they have different education systems and structures. In Türkiye, the education system is organised into a 4 + 4 + 4 structure, comprising 12 years of compulsory education: 4 years of elementary school, 4 years of secondary school, and 4 years of high school. Conversely, Azerbaijan's education system consists of 4 years of primary education, 5 years of lower secondary education, and

Table 1. The demographic information of participants.

Student code	Student gender	Student age	Parent code	Parent	Parent age
P1	Female	11	Pa1	Mother	32
P2	Female	11	Pa2	Mother	38
P3	Male	11	Pa3	Mother	38
P4	Female	10	Pa4	Mother	40
P5	Male	10	Pa5	Father	40
P6	Male	10	Pa6	Mother	37
P7	Female	10	Pa7	Mother	34
P8	Male	11	Pa8	Father	40
P9	Male	11	Pa9	Mother	39
P10	Male	10	Pa10	Mother	38
P11	Female	11	Pa11	Mother	39
P12	Male	11	Pa12	Mother	43
P13	Female	11	Pa13	Mother	41

2 years of upper secondary education, with 9 years of compulsory education (Ergin, Açışlı Çelik, and Akkaya 2021).

In sampling, the researchers tried to ensure a balanced representation of both school campuses and the parent population involved in the research. Eight participants – P4, P5, P10, and P13, along with their parents – are from Azerbaijan, while the rest were from Türkiye. The differing ratio is due to the differences in class sizes and the voluntary free time participants had during data collection. Including samples from both countries within similar age groups allowed for a comprehensive examination of learning experiences among high socioeconomic status (SES) students in diverse educational environments. This approach facilitated a more universal interpretation of self-learning and enabled the exploration of educational outcomes for geographically distinct generations raised amid advancements in digital and artificial intelligence (AI) technologies.

Data collection tools and procedure

Data were collected through semi-structured interviews, with questions developed in collaboration with educational experts and class teachers to ensure they could elicit in-depth information on the self-directed learning processes of primary education groups. For instance, students were asked, 'How do you learn about a subject or topic that you are most curious about, especially when you are outside of school or at home?' Corresponding questions were posed to parents to assess their perspective on their child's learning behaviours: 'How do you think your child learns about a subject or topic that they are unfamiliar with or curious about when they are outside of school or at home?' Each student interview was conducted in the presence of their family, followed by a one-to-one parent and researcher interview. Additionally, an ethics committee approval was obtained for this study.

Data analysis

Thematic analysis was conducted according to the guidelines provided by Braun and Clarke (2012), which involved the coding of data, categorisation of codes into potential themes, and the refinement of these themes. Two researchers independently analysed the data at different times to enhance the dependability of the findings. The convergence of information from different sources (parents and students) was used as a form of data triangulation to test the validity of the findings and to ensure a comprehensive understanding of the self-learning strategies and resources utilised.

Trustworthiness

To ensure trustworthiness, several strategies were implemented. Credibility was achieved through prolonged engagement with participants and triangulation of data sources from both students and families. Transferability was addressed by providing detailed descriptions of the context and participants, allowing others to determine the applicability of findings to other settings. Direct quotations are given in the text. However, minor grammar and flow corrections were made on the quotes to enable better readability. All translations from Turkish to English were done by an AI tool, which adapted the quotes and sentences without changing the meaning of the text, as controlled by the researchers individually. Dependability was ensured through an audit trail, detailing all decisions made during the research process. Confirmability was achieved by maintaining a reflexive peer debriefing. The researchers requested help from another academic to oversee data analysis and compare results at various times. The process of collecting data from both parents and students and cross-verifying the responses ensured an integrated understanding of the phenomena, thereby enhancing the overall reliability and validity of the research findings.

Limitations of the study

All participants in the study came from families with high socioeconomic status (SES), and thus, the findings should be discussed within this context. Students from lower SES backgrounds might face different challenges and have access to fewer resources, which were not accounted for in this study. This study paid attention to the use of digital tools and online resources for self-learning, as students with tablets and computers at home were included in the sample. While this reflects current trends, the experiences of students who prefer or rely on non-digital self-learning methods may be underrepresented, though they were also explored in the study. Student interviews were conducted in the vicinity of or in the presence of their families. Although the researchers did not perceive any effect of families' presence on the interviews, this proximity might have influenced the responses, potentially leading to biased or socially desirable answers.

Findings

The study findings from fourth and fifth-grade primary school students and their parents are organised and presented under various themes and subthemes (See Figure 2). The researchers identified one main theme (self-learning in the twenty-first century) and several supporting sub-themes: self-learning sources, strategies, emotions felt in the process of learning on their own, and problems in students' individual learning processes along with student and family profiles.

Students' self-learning resources

One of the questions the researchers had was, 'What are the resources and tools that students use when they learn new topics?' The answers given to this question by students and families are presented in Figure 3 using a concept map.

Among the answers given within the scope of self-learning sources, various tools and resources for students emerged. An important point for this sub-theme is that although students also sought help from families and peers, these were not included in the list of learning sources, as the researchers aimed to present tangible sources of information.

Within this sub-theme, students said they predominantly used online and digital tools for self-learning. The tools documented in the interviews included smart devices, visuals, printed materials, websites, games, and educational sets. YouTube, Google, and posters were among the most emphasised codes in the sub-theme of self-learning sources. Indeed, most of the students participating in

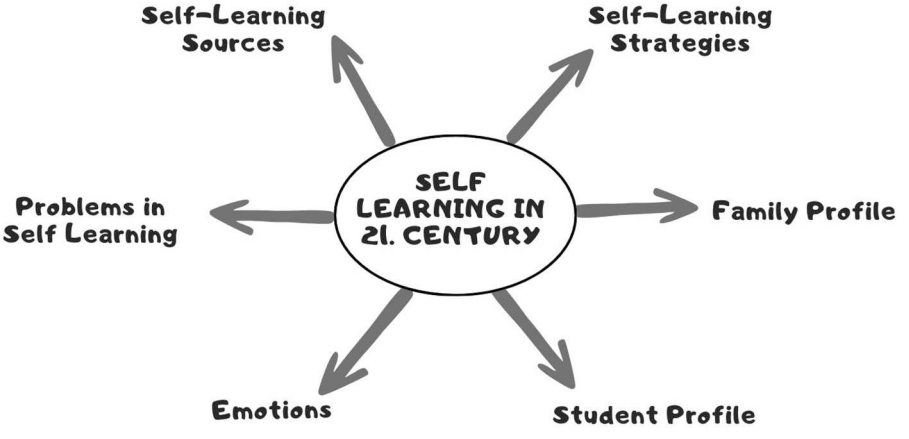

Figure 2. Self-learning at home and out of school in the twenty-first century.

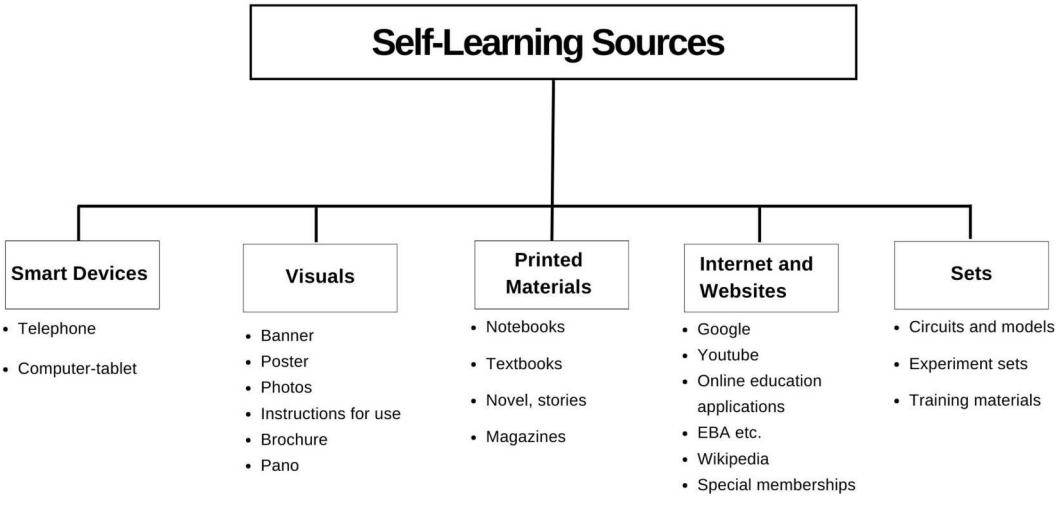

Figure 3. Students' learning resources.

the study, as confirmed by family responses, stated that Google and YouTube were the first sources they used when they were curious about any topic during the day. Brief quotes from student participants are provided below:

> For example, the teacher assigned homework asking what cyberbullying is, but I wasn't at school that day. I search on YouTube. I watch videos there about what cyberbullying is and I learn from them. For instance, I can learn all the topics covered at school on the days I am absent by watching videos on YouTube. (P3)

Among the answers given by the student participants, learning from banners and posters under the visuals category is also a popular answer, as is the case with Google and YouTube.

> … there was a huge poster in that hospital … It said that breast milk was healthy for children. I learnt there that breast milk is very necessary. Then I learnt more information about it by doing research on Google. We also brought home a poster. (P1)

After P1's interview, her parent Pa1 explained the poster case and highlighted that colourful printed materials attract their attention:

> She generally enjoys reading posters, brochures, and anything that catches her attention. Since colorful items attract her attention, she can learn from various sources.

Other popular answers included learning through film and documentary, educational material, and various mobile applications.

Students' learning strategies

Within this sub-theme, the student responses primarily highlight learning from family and peers, along with learning through inquiry, listening, explaining, doing, and research. Nearly all students participating in the study emphasised learning from family and peers in their answers. The students underscored the importance of support from peers and family in their learning processes, noting that this support is crucial not only for acquiring knowledge but also for revisiting and reinforcing it.

Figure 4 answers the research question, 'What strategies are used by students to acquire new information at home and outside of school?' Upon analyzing the responses from participants, the most commonly cited strategies include learning through peers, learning from family, asking questions and doing research, etc.

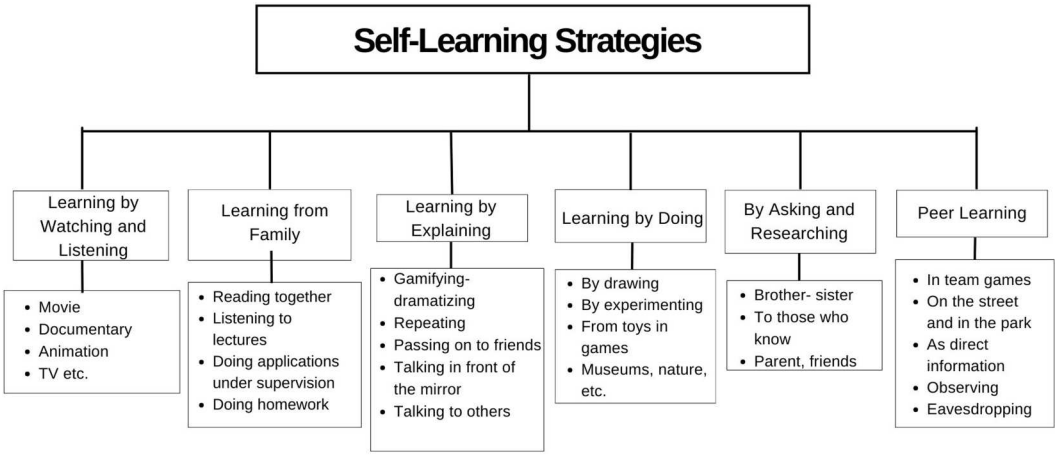

Figure 4. Strategies employed for acquiring new information at home and outside.

> I think I can learn better when my friends explain things to me. I learn much better when my friends explain the topics to me before exams. (P12)

> We were discussing how expensive the chocolates in the cafeteria were. My friend mentioned that chocolate gives a lot of energy to the brain. Later, in fourth grade, I learned that chocolate provides energy because it contains carbohydrates. I had learned in second grade that chocolate energizes the brain. I also learned in fourth grade that carbohydrates are a source of energy. (P1)

These responses indicate that peer-mediated learning is not only common but also highly valued by students. They prefer learning through their peers more compared to other methods, believing it to be more effective and efficient. Students perceive peer learning as a way to grasp concepts more quickly and thoroughly, possibly due to the shared language and experiences among peers.

Students also mentioned learning from family, similar to peer learning.

> When I communicate with my friends outside of school, I can learn a lot from them. For instance, I learned that torn money is not valid … I learned to make wraps from tree leaves in the garden. By watching my mother, I learned to bake cakes and pastries at home. (P6)

Pa6 highlighted that her child models her by referring to the code of learning from family:

> Once, he watched me bake a cake. Later, he wanted to bake a cake himself and, without looking at any instructions, he made it solely by recalling what he had observed. It was quite surprising to me. (Pa6)

Another noteworthy finding is that several students emphasised learning best when they share their knowledge with others, whether in games, casual conversations, or at the table. Explaining or recounting their interesting learning experiences to others helps them better retain the information for future recall. This suggests that the act of teaching or sharing knowledge serves as a powerful reinforcement tool in the learning process.

> I learn by listening and drawing. I also learn by explaining. Sometimes, I learn very well while explaining to my friends. There are times when I learn through play. In fact, sometimes when we play 'teacher', I explain the week's topics to my friends. (P11)

Problems in self-learning

In the study, responses to the question 'What challenges do you face during your self-learning process?' were analysed. Two recurring topics emerged under this sub-theme: 'being in a whirlpool when faced with uncertainty' and 'encountering websites with inappropriate content'. These

categories primarily stem from online learning experiences as students prefer online tools more compared to other learning sources. Parent feedback indicates that students may feel completely overwhelmed and caught in a metaphorical whirlpool when navigating the unfamiliar expanse of the internet, searching for various information sources to learn about their topics. Families are also concerned that inappropriate content might capture students' attention and distract them from their learning objectives. Consequently, parents prefer paid special memberships on online platforms to mitigate these risks. In regard to inappropriate websites like other families, Pa3 summed up:

> We use websites that we find safe and have researched. We also use applications recommended by academics on the internet. For example, he uses … education (paid website) once a week. He also plays various games on … (paid app) twice a week. (Pa3)

Examining the students' responses reveals that encountering dangerous content is also a problem in their self-directed learning process and students may get lost in the oceon of information.

> When I try to learn on my own and encounter difficulties, I get frustrated (because I navigate among many pages) but I never give up (for finding the right source). (P6)

> Sometimes, I accidentally visit inappropriate websites, and content unsuitable for children, like violence, appears. My mom gets upset about it, and this is quite troubling for me. (P7)

Students in the sample prefer online tools for learning, complemented by support from family and peers. However, some students have expressed difficulties with time management while conducting research or acquiring new information. Analysis of the overall student responses reveals that children who struggle with self-directed sources often encounter issues with motivation. Leaving students without guidance, supervision, or engagement during the self-learning process can lead to various emotional and social challenges. Therefore, it is crucial that students are equipped with guidance, resources, and skills to manage their self-learning process effectively.

Emotions students feel in self-learning

One of the questions posed to student participants was, 'How do you feel when you are self-learning?'. These elicited responses primarily highlighting feelings of happiness, confidence, and freedom. Participants expressed that they feel empowered and happy when they learn new information on their own.

As Figure 5 shows, most of the students mentioned they feel free, powerful and happy when they learn something by themselves.

> I feel very happy when I can do things on my own. I tell my father about it, and he praises me. (P5)

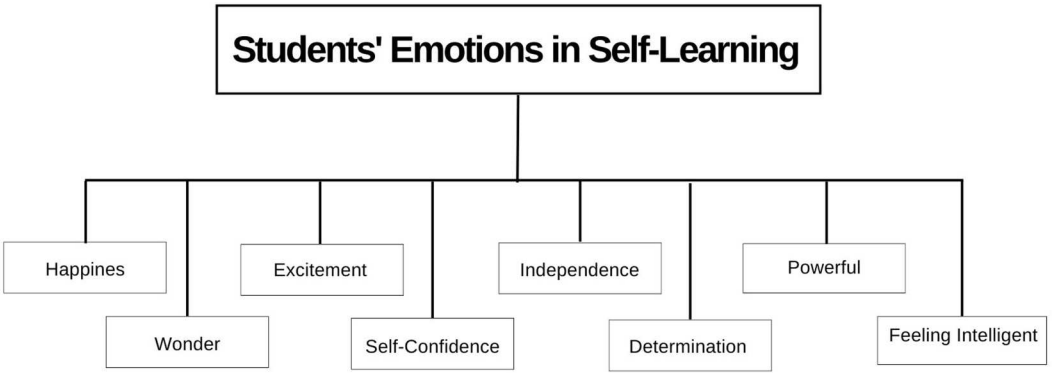

Figure 5. How students feel when they learn something by themselves.

> I am amazed and happy when I learn new information. Doing it on my own makes me even happier. (P3)

Pa3 commented on her son's self-learning and happiness at home:

> I think it is more effective when he learns independently through applications like … Campus (paid website). Seeing him happy while learning on his own makes me happy as well. (Pa3)

Although there is significant variation among individuals, students sometimes experience negative feelings alongside positive emotions. This occurs when they face problems in self-learning, leading to feelings of being lost in an ocean of frustration and sadness. This topic is covered under 'Problems in Self-Learning'.

Student profile

In the study, the responses to the research question 'What are the characteristics of students in the self-learning process?' have been sought. As indicated in Figure 6, students who engage in self-directed learning are often described as digital learners. They are capable of learning through social interaction, possess self-regulation skills, and employ strategic planning in their learning endeavours.

The students in the sample have full access to the internet and online tools, which help them extensively utilise the digital world. They also learn from each other through peer learning and regulate their own learning journey as much as possible. One noteworthy characteristic of these students is their strategic approach to learning as self-regulating individuals. When faced with a quest to learn a specific topic, they first check online tools. If they are unsatisfied, they seek help from family and friends in consecutive steps. This indicates that they are not focused on a single learning method but possess meta-learning skills that enable them to navigate multiple channels for learning.

> Sometimes I ask … (website), it comes up with nonsense, nothing related to the question I asked. Then I ask my mom, and if I can't learn from my mom, I ask my teachers. Or I ask my friends, I can learn from them. Sometimes I can also find it on … (online tool). (P1)

Students with self-regulated skills also prefer half-school and half-internet-based learning.

> I think learning at home is fun. Instead of staying at school for 8 h, it would be fun if we could stay for 4 h at school and then learn for 4 h at home. (P2)

Pa2 explained her home environment, which made it clear why P2 is very happy learning at home, considering the vast opportunity and personalised learning environment she enjoys:

> Her father introduces different applications. Applications like … (app) and … (app) catch her attention, so she initially learns from them and then uses Google to delve deeper. She opens her e-platform and does her own work from there. She learns most information from a platform called … … (book site), which contains books that review school subjects and cover learning objectives. By looking at those, he learns many things … … We have some toys at home that are necessary for developing certain skills. We provide these through internet platforms and applications. Additionally, we have a large library. Since she loves reading, she learns

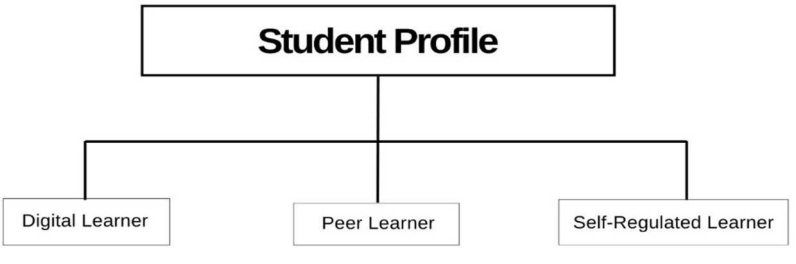

Figure 6. How students fit into different profiles and categories.

many things from there as well. She generally prefers to learn by watching films and documentaries, so we have memberships to several film websites.

Family profile

In exploring the research question 'What is the family profile of students engaged in self-learning?', Figure 7 shows some typical profiles that emerged from the analysis.

As seen in Figure 7, two main family profiles emerge, with the most frequently mentioned profiles being families that are supportive of their students in every aspect and other profiles that have adequate resources and attention for their students but limited time due to work commitments. An interesting finding from both groups is the fact that they both resort to digital and other physical resources as much as possible, the only difference being the time spent with the student while attending these sources. These two family types can be merged as digitally supporting and resourceful families.

The study highlights the significant presence of digital and resourceful family profiles. Families providing digital support can enhance their children's learning processes through various applications and websites. These families not only provide the necessary tools for learning but also engage actively in their children's educational activities through game sets and books, often facilitating learning in a more interactive and effective manner. This engagement can range from supervising the use of educational apps to discussing content learned via digital platforms, thereby contributing positively to the educational outcomes of their children.

Pa4 and Pa10 explained how they support their children, with Pa4 unable to provide onsite assistance due to time constraints of their job, while Pa10 alternates with her partner to support their kids:

> In addition to platforms provided by our school like … and … … (website and app), we also use … and … (private film sites). Honestly, we get anything that has a kids section. Since we are a working family, we realize we can't always provide as much support as we would like. We try to fill that gap this way. (Pa4)

> At home, we usually explain the topics he doesn't understand. If his father is available, he explains; if I'm available, I explain. Sometimes, we have him watch videos and do activities from the internet. We also use informational books and magazines. (Pa10)

These responses illustrate that the child benefits from a family environment that supports self-directed learning through digital means, enhancing the learning process with accessible technology. There is a supportive family which helps students learn through digital and tangible sources.

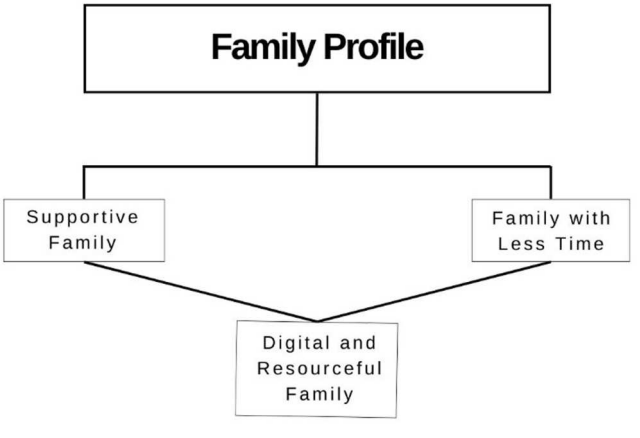

Figure 7. How families fit into different profiles and categories.

Discussion

This study highlights the multifaceted nature of self-learning among primary school students in the twenty-first century, drawing insights from two schools in neighbouring countries: Türkiye and Azerbaijan. The participants' responses showed that the young generation from both countries, born into the digital world, shares similar self-learning habits, combining both traditional self-learning methods and technologically supported pathways.

The findings cover a range of sub-themes, such as learning sources and strategies, challenges in self-learning, emotional factors, student characteristics, and family profiles. Educators and policymakers should consider these aspects to design effective self-learning pathways and support structures for twenty-first-century learners. The study's main findings and supporting categories and codes are re-visualized in Figure 8:

Self-learning sources

Students utilise a variety of tools and resources for self-learning, including smart devices, internet sites, game and educational sets, as well as traditional materials like visuals and printed materials. These resources provide a foundation for independent study and exploration.

While students prefer authentic materials in learning new information on their own, students demonstrate proficiency in using digital tools and resources, aligning with findings that students of similar age groups generally possess competent digital literacy skills (Pala and Başıbüyük 2020). Mok et al. (2005), in their analysis of the self-learning experiences of 1253 primary school students, found that printed material (reading) was the most commonly nominated source, with ICT and other sources also present on the list. While this study presents similar sources, the focus seems to have primarily shifted from print materials to digital solutions.

The findings confirm that the e-learning process is fundamental to an individual's self-learning, with all 13 students and families reporting the use of Google, YouTube, etc. during the learning process. These tools and digital trends are consistent with those observed in numerous studies (Aragoneses and Messer 2020; Arvanitidou et al. 2015; Dabamona and Yunus 2022; Duffy, 2008; Farag, Bolton, and Lawrentschuk 2020; Rahmatika, Yusuf, and Agung 2021) Digital applications effectively

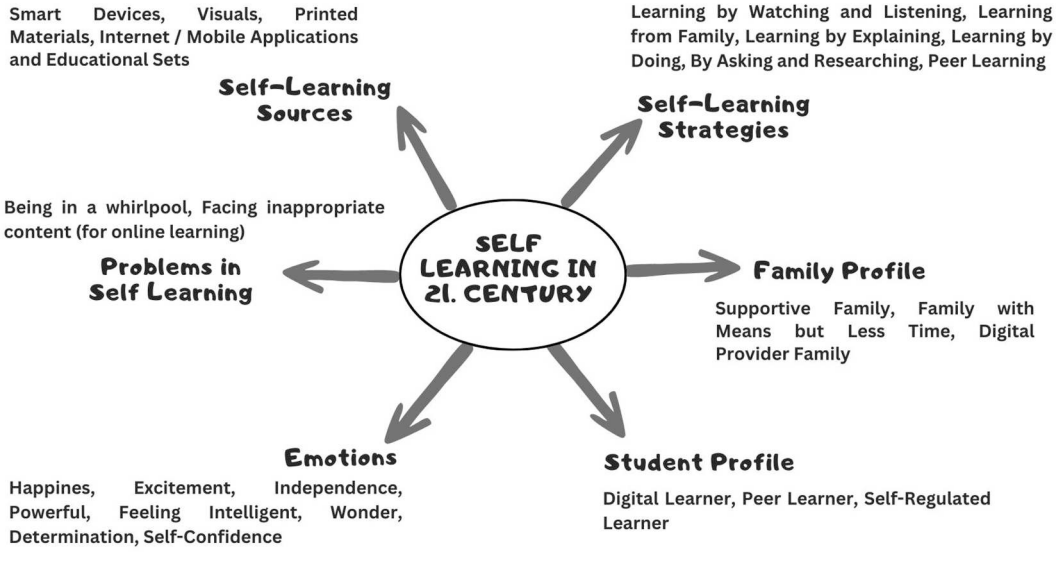

Figure 8. Theme, sub-themes, and supporting categories for self-learning.

support students' development (Hsiao et al. 2014). The appropriate online platforms facilitate both independent learning and learning with family support, enhancing students' ability to acquire new information.

Self-learning strategies

The strategies for self-learning include learning by watching and listening, learning from family, learning by explaining, doing, asking, and researching, as well as peer learning. These strategies emphasise the active engagement of students in their learning process through diverse and interactive methods.

During data collection, it was revealed that students acquire new knowledge through family and peers almost as frequently as they use digital tools and video resources. Students especially deepen their understanding of topics learned at school through discussions with peers and family, which leads to the acquisition of new information. Wong et al. (2018) documented in their e-learning study that primary school students often seek help from adults, and those who seek help are more likely to succeed in the learning process.

Students are seen to be capable of learning on their own mainly through online medias and utilise family and peer learning. This shows a dual capability where such students not only thrive in self-learning settings but also excel in collaborative learning environments. This blend of learning preferences can be particularly beneficial in modern educational settings, where a combination of independent and collaborative learning activities is often encouraged. The dimensions of peer and family learning among other categories are crucial and should not be overlooked in the design of next-generation school systems. Peer learning, in particular, enhances students' communicative skills, critical thinking, and self-confidence, contributing significantly to their overall academic and social development (Stone, Cooper, and Cant 2013).

Future educational models should integrate both asynchronous and digital learning while preserving the social aspects of schooling, including extracurricular activities that promote interaction among peers and family members. Such interactions are vital for fostering a supportive learning environment which must be enhanced by self-regulated learning capabilities. The positive impact of peer learning and self-regulated learning processes is well-supported by research (Lim et al. 2020). Hence, peer learning and family support will remain crucial for the development of students in primary education age groups. This research demonstrates that learning becomes more enduring with the integration of online tools, peers, and family support.

Problems and emotions in self-learning

Challenges faced during self-learning primarily include being overwhelmed by the large array of sources on the internet and inappropriate content, referred to as 'being in a whirlpool', and 'encountering inappropriate content online'. These issues highlight students' difficulties when navigating online resources without adequate guidance.

When students safely browse the internet and add to their knowledge, various emotions associated with self-learning emerge, such as happiness, excitement, independence, feeling powerful, intelligence, wonder, determination, and self-confidence. These positive emotions are crucial as they keep motivating students to continue their self-directed learning endeavours.

In the process of self-learning, students may experience both positive and negative effects. Although students often feel freer and happier when learning independently, they can experience feelings of despair or become overwhelmed when encountering wrong sources during their learning process. Some students reported experiencing negative emotions such as anxiety, stress, and irritation when they encountered problems. Students sometimes spend much time searching without finding the topics they need or feel anxious due to difficulty accessing the right resources. Similarly, the negative effects and safety problems were documented for the early age groups in the

literature (Temban, Hua, and Said 2021). This indicates the psychological challenges that can accompany self-learning in the online environment, especially when students lack adequate support or navigation skills to face difficulties.

From this perspective, providing students with structured online learning guides during their self-directed learning processes will be beneficial. These guides can help them become digitally self-regulated learners and manage their learning paths more effectively, reducing frustration and enhancing the overall positive learning experience.

Student profile

Key characteristics of students in this study engaged in self-learning include being digital learners, peer learners, and self-regulated learners. These profiles reflect the ability of students to adapt to modern educational demands, utilising technology and collaborative skills effectively.

The study illustrates the effectiveness of online and self-directed learning in helping students acquire complex skills independently. For instance, one primary school student opted to learn drawing through online resources rather than traditional one-on-one teaching, demonstrating the importance of self-regulated learning. This choice shows how students are increasingly using the internet's extensive educational content to enhance their learning autonomy. Developing self-regulated learning in young students not only boosts their academic performance but also contributes positively to their self-confidence and happiness, as motivation in learning significantly influences the perceived value of educational experiences (Tzohar-Rozen and Kramarski 2014).

Furthermore, some students preferred online education and reduced school hours, allowing them to learn at their own pace and according to their interests. Researchers, such as Tsai, Shen, and Tsai (2011), support the idea that students should benefit from a combination of self-regulated learning and blended online education. The findings in this study suggest that students can learn digitally and self-direct themselves. They can support their own learning through peer and family interactions as well.

Family profile

Family involvement in self-learning is characterised by supportive families and families with digital means but less time. This dimension underscores the role of the family environment in facilitating the self-learning process, depending on their ability and availability to support the students.

The analysis revealed that while the parents come from higher socioeconomic backgrounds, these families face challenges in finding enough time to engage with their children. Although these families generally empower students' learning through different means and online tools, the lack of time can negatively impact the quality of support that children receive at home, which is crucial for navigating the emotional ups and downs of independent learning. Other families in the sample were found to be supportive by actively participating in their children's learning processes through games or demonstrating how to use online tools. As family profiles are known to affect students' educational attainment (Robertson and Reynolds 2010), there should be more studies on digital family profiles with a solid time and less time devoted to children to see their effect on self-learning.

In conclusion

The study indicates that the diversity of learning resources and tools available to students has significantly expanded in the twenty-first century, shifting from physical to online assets. Students with high SES backgrounds from both countries leverage these opportunities, allowing them to comfortably and independently learn various subjects outside the classroom. High SES students from both Türkiye and Azerbaijan seem to display similar habits in their learning experiences.

Both parents and students agree on the widespread use of computers and smartphones to satisfy curiosity and fill knowledge gaps, particularly through platforms like YouTube and Google, as well as various paid and unpaid tools. They also resort to classical sources of information like printed materials and posters. These tools are pivotal in fostering self-regulated learning, allowing students to explore subjects at their own pace and preference.

Self-learning students employ methods such as watching, listening, explaining, and engaging in family and peer learning, significantly enriching their educational experiences. Self-regulated students strategically choose sources and strategies that maximise the benefits from a vast array of information sources, from print and individual interactions to digital means. This active engagement is bolstered by the integration of family and peer interactions, which are essential for both emotional support and academic development.

The study pinpoints challenges such as navigating overwhelming online content and facing inappropriate material and highlights the need for structured guidance in digital learning environments. Emotionally, while self-learning often induces positive feelings like happiness and confidence, it can also expose students to stress and anxiety, especially when encountering difficulties online. Addressing these emotional fluctuations is crucial for maintaining the motivation necessary for continued educational pursuits.

The involvement of high SES families in their children's learning path varies, with some providing substantial support through digital means, while others struggle with time constraints, again with digital tools. The study advocates for educational models for self-learning that balance asynchronous and digital learning with necessary social interactions to enhance students' academic performance and emotional well-being, proposing a modern educational framework that embraces the benefits of self-directed and collaborative learning.

Lastly, the study observes that digitalisation has transformed the traditional outlook of self-learning in high SES settings, with the potential for further changes in education systems as artificial intelligence (AI) advances and digital access becomes more equitable across households. Although high SES families in the sample did not prominently mention AI in the context of digital sources, the self-learning process and digital learning for students will likely be significantly transformed with the greater use of AI tools and avatars at the primary education level. Future studies can focus on this intersection of Ai-digital transformation and self-learning practices.

Declaration of generative AI and AI-assisted technologies in the writing process

While preparing this paper, the researchers utilised various AI translation and editing tools to handle participants' quotes and to proofread all texts. Following the use of these services, the researchers reviewed and validated the tasks performed by the tools.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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