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ЗАМАНАУИ САНДЫҚ ТЕХНОЛОГИЯЛАРДЫҢ БІЛІМ АЛУШЫЛАРДЫҢ ЕСТЕ САҚТАУ ПРОЦЕСІНЕ ӘСЕРІ

ВЛИЯНИЕ СОВРЕМЕННЫХ ЦИФРОВЫХ ТЕХНОЛОГИЙ НА ПРОЦЕСС ЗАПОМИНАНИЯ ОБУЧАЮЩИХСЯ

INFLUENCE OF MODERN DIGITAL TECHNOLOGIES ON THE PROCESS OF STUDENTS' MEMORY

Abstract. *This article discusses the analytical research on the impact of information and communication technologies on the process of information processing by humans. The probable changes in memory in the process of cognition and interaction with digital technologies are considered. The article presents the results of a study on changes in strategies for memorizing and extracting information from memory, as well as structural changes in the brain in conditions of easy access to information resources through digital devices. For the objectivity of the analysis, the study was conducted among different categories of respondents. The factors determining the success of memorizing information in the learning process are considered. The probability of information overload and its results for the quality of training are considered in detail. The conclusion is made about the need for further study of the transformation of mnemonic activity, the need for detailed control of the educational process with the help of intelligent educational process management systems for a more successful perception of the material.*

Keywords: *Memory, perception, modern technologies, students, artificial intelligence, education.*

Аңдатпа*. Бұл мақалада ақпараттық-коммуникациялық технологиялардың адамның ақпаратты өңдеу процесіне әсері туралы аналитикалық зерттеуі қарастырылады. Таным және цифрлық технологиялармен өзара әрекеттесу процесінде есте сақтаудың пайда болған ықтималды өзгерістері қарастырылады. Сандық құрылғылар арқылы ақпараттық ресурстарға оңай қол жеткізу жағдайында адамның жадысынан ақпаратты есте сақтау және алу стратегияларының өзгеруін, сондай-ақ мидың құрылымдық өзгерістерін зерттеу нәтижелері келтірілген. Талдаудың объективтілігі үшін зерттеу респонденттердің әртүрлі жас аралығында жүргізілді. Оқу процесінде ақпаратты есте сақтаудың сәттілігін анықтайтын факторлар қарастырылады. Ақпараттың шамадан тыс жүктелу ықтималдығы және оның оқыту сапасы үшін нәтижелері егжей-тегжейлі қарастырылады. Мнемоникалық қызметті трансформациялауды одан әрі зерттеу қажеттілігі, материалды сәтті қабылдау үшін оқу процесін басқарудың интеллектуалды жүйелерін қолдана отырып, оқу процесін егжей-тегжейлі бақылау қажеттілігі туралы қорытынды жасалады.*

Түйін сөздер: *Есте сақтау, қабылдау, заманауи технологиялар, білім алушылар, жасанды интеллект, білім беру.*

Аннотация. *В данной статье рассматривается аналитическое изыскание о воздействии информационно-коммуникационных технологий на процесс обработки информации человеком. Рассматриваются вероятные изменения памяти в процессе познания и взаимодействия с цифровыми технологиями. Приводятся результаты исследования по изучению изменений стратегий запоминания и извлечения информации из памяти, а также структурных изменений мозга в условиях легкого доступа к информационным ресурсам через цифровые устройства. Для объективности анализа исследование было проведено среди разных категорий респондентов. Рассматриваются факторы, детерминирующие успешность запоминания информации в процессе обучения. Подробно рассмотрена вероятность информационной перегрузки и ее результаты для качества обучения. Делается вывод о необходимости дальнейшего изучения трансформации мнемической деятельности, о необходимости детального контроля учебного процесса с помощью интеллектуальных систем управления учебным процессом для более успешного восприятия материала.*

Ключевые слова: *Память, восприятие, современные технологии, обучающиеся, искусственный интеллект, образование.*

Introduction. Some time ago, the ability to learn something by heart was considered a good tool for successful learning. At one time, students had to remember books in whole chapters. Today, in the victorious world of Google, when all the information is in our hands, we don't force ourselves to remember the facts, let alone remember all the books. Currently, we can search for answers to the question we need through any Internet resource. In the human brain, the process responsible for remembering information, reproducing it, forgetting it, and remembering it is called memory. Memory is the basis of a person's abilities, a condition for learning, acquiring knowledge, and forming skills. Without the process of consciousness, the normal functioning of both a person and society is impossible.

It is known that the impressions that a person receives about the world around them are stored, recorded and reproduced at the right time, leaving a certain trace. These processes are called E. S. L. Rubinstein «without consciousness-we would live only for a moment. Our past would disappear for the future, and our present would disappear from the past» - he wrote.

Memory plays a particularly important role in the learning process. Due to the increased load on the processes of memorizing and reviving certain information at school, college, or university, it is necessary to control such a mental process as memory, starting from primary school age. Many psychologists have studied memory. Mechanisms and types of memory are diverse – motor, emotional, figurative, verbal-logical. P. P. Blonsky, L. S. Vygotsky, J. Bruner, J. Piaget, P. I. Zinchenko, A. A. Smirnov and others made a great contribution to the development of the processes of voluntary and involuntary memory. Ebbinghaus, G. Muller, and A. Pilzecker are the founders of one of the first psychological theories of memory, the associative theory. The author of the monograph “Memory development” is A. N. Leontiev. Features of memory in primary school age were studied by A. A. Smirnov, P. I. Zinchenko, A. N. Leontiev and other prominent psychologists [1-2].

The educational load of modern students is becoming increasingly heavy. One of the main reasons is the development of modern technologies and a large number of information flows. Students visit various websites, social networks, instant messengers, video channels, etc. several times a day. However, the abundance of information can not only positively affect students, but also negatively. The question arises as to why this might be the case. One Youtube channel is viewed by people more than 4 billion times a day [3-4].

Materials and methods of research. Currently, students should be able to choose information in order to avoid negative impact on themselves due to a large amount of information. To do this, when working with Internet resources, you need to pay attention only to the specific information itself. Well, you don't need to focus on unnecessary information, such as ads, news, or mobile phone messages. When a person sleeps, the accumulated unnecessary information is turned off by our brain.

In this regard, we will consider the impact of modern technologies on the memory process of

students. To do this, we will first focus on the results of our research work. This survey aims to determine how well a person remembers information. The questionnaire consists of 16 questions. The survey involved 547 respondents, age range 12-37 years, the vast majority-17-19 years. Of the respondents, 456 were women and 91 were men.

Results and their discussion. The questionnaire consisted of the following questions. «Name you region?» (Figure 1). As can be seen from the chart, 78% of respondents belong to the East Kazakhstan region, 8%-Almaty, 7%-Mangistau, 5%-South Kazakhstan, 3%-Kyzylorda, 2%-Akmola, 4%-Zhambyl, Pavlodar, Aktobe, Kostanay.

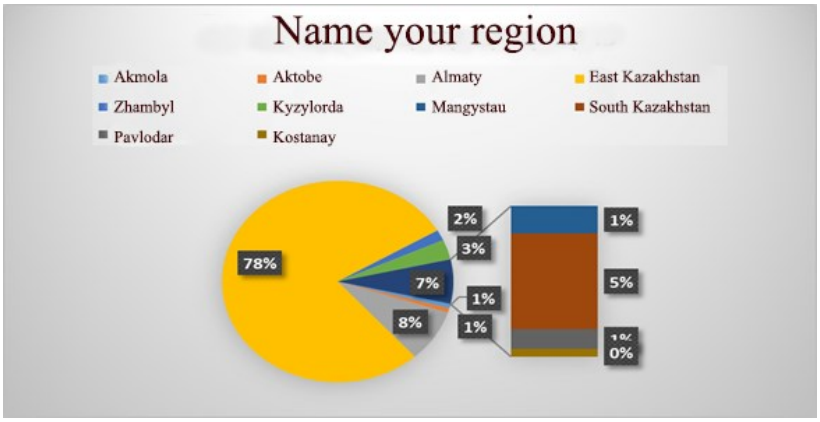

Figure 1. Polled regions

The question «What educational institution» (fig. 2). 65% of respondents from universities, 25% from colleges, and 10% from schools took part in the survey.

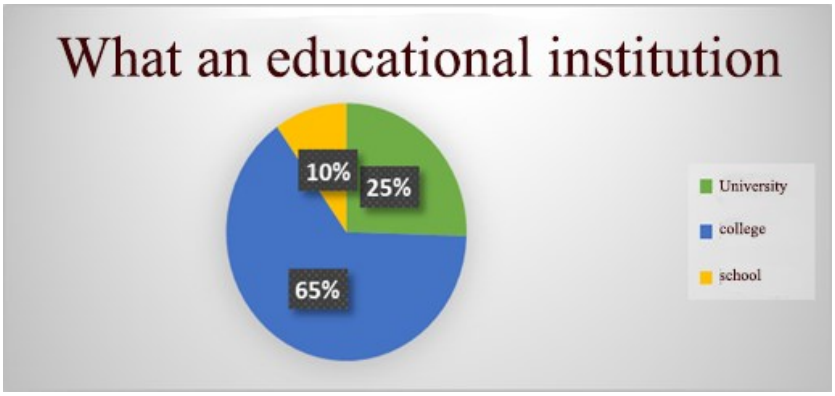

Figure 2. Educational institutions surveyed

The question «your course (s)» was asked by respondents from the 8th grade-4th year. «Your age» showed that the age of survey participants is 12-24 years, the vast majority-17-19 years. 85.1% of women and 14.9% of men participated in the question «your gender». Here we see a predominance of women. The reason is that the majority of respondents are students of pedagogical specialties.

«Do you enter your PIN code in your mobile phone or ATM for the first time?» asking questions about every day or repetitive activities at certain intervals is perceived by our brain as a skill or habit, and given the age of the respondents, 92% of the participants in this question% - if

the answer is «Yes», 8% «I said no.» That is, it follows that most of the participants are well developed in visual-imaginative consciousness. Respondents who answered «no» are encouraged to develop visual memory as a suggestion.

Figure 3. «Mobile phone with a pin code for the first time or enter it at an ATM? » survey results

«Do you remember the full name of your new acquaintance?», «Five phone numbers of loved ones and colleagues do you know by heart? Questions» (Figure 4) are focused on the audial perception and visual memory of the respondents. As can be seen from the chart shown below, the respondents who answered «Yes» are 73%. The number of respondents who answered «no» is 27%.

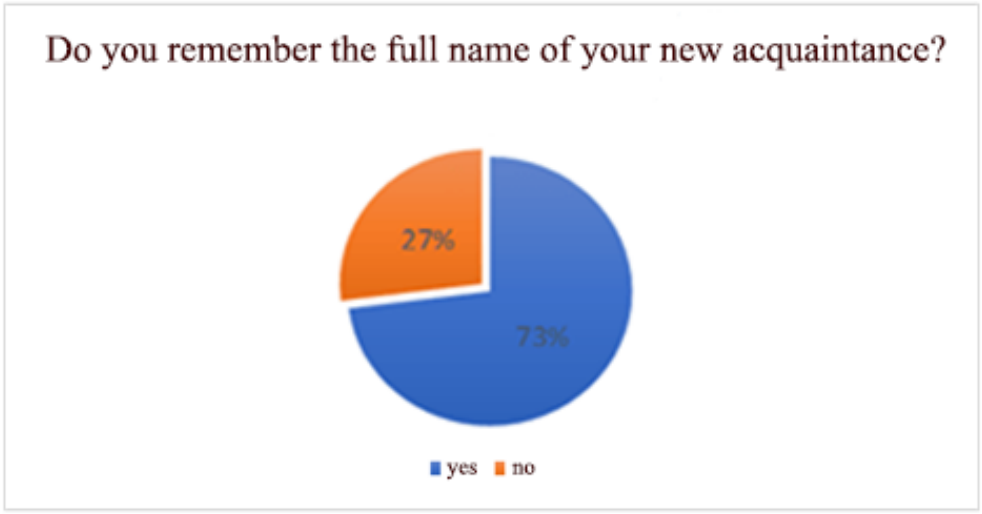

Figure 4. «Do you fully remember the name of your new acquaintance? »

Five phone numbers of loved ones and colleagues do you know by heart? 62% of the participants said «yes» and 38% said «no» (Figure 5). That is, in this indicator, we see a good indicator of students. We note the good development of students ' audial perceptions and the level of short-term memory. Short-term memory-this is where the distracted information is stored. In-

formation does not remain unchanged, it is processed and analyzed [5-6].

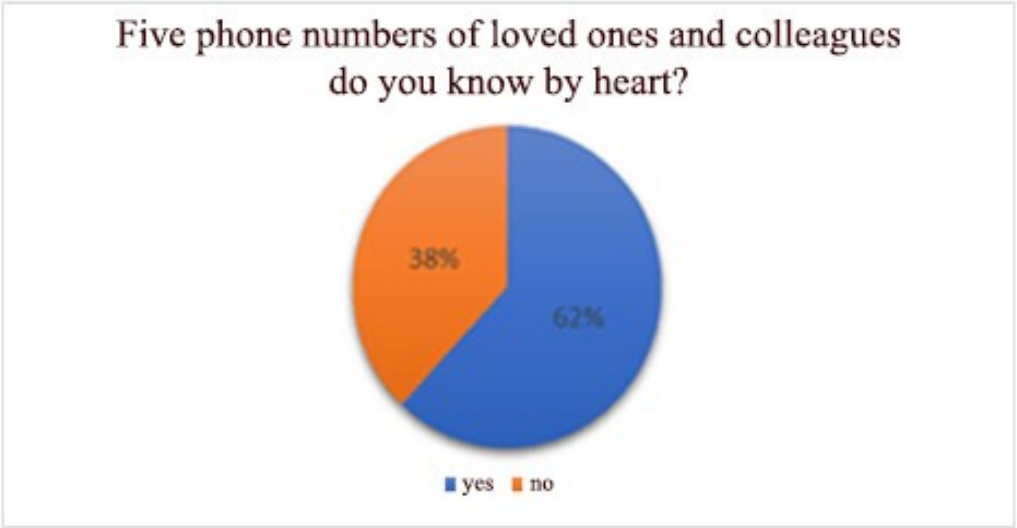

Figure 5. «Do you know the phone number of five relatives and colleagues by heart?» survey results

«Do you often read books?» 75% of the participants answered «yes» and 25% answered «no» (Figure 6). If so, it is gratifying that students often read books. This is because reading, according to many social studies, calms the nerves of a person, develops imagination, and also improves memory [7-9].

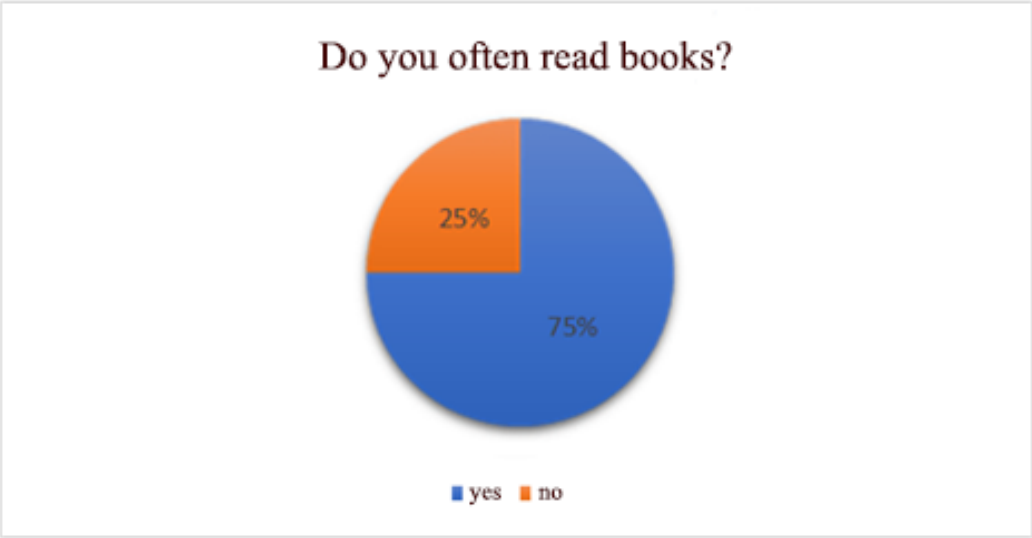

Figure 6. Do you often read the book? survey results

In the age of rapid development of modern technologies, it seems that a smartphone, a laptop (without a computer) is impossible. These devices are both a source of new knowledge and a format for various entertainment. However, only useful ones can be obtained if they are able to use them effectively in both. As we can see the result of the study in Figure 7, «Do you use your smartphone often? » 96% of those who answered «yes» to the question «No» - 4%.

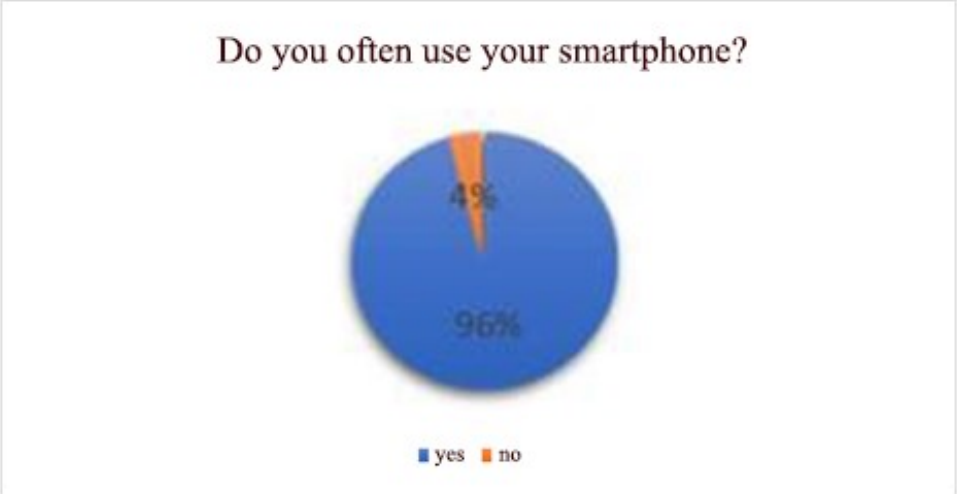

Figure 7. «Do you often use your smartphone? survey results»

«Do you often use a laptop (computer)?» 56% of respondents said yes, and 44% said no (figure 8). From this, we can conclude that the smartphone is currently an indispensable tool for the educational process. That is, due to the process of distance learning, we note that the duration and frequency of using the smartphone indicate a long period of time. Well, the presence or absence of a laptop (computer) indicates the social status of these students. Or there are two or more students in the same family.

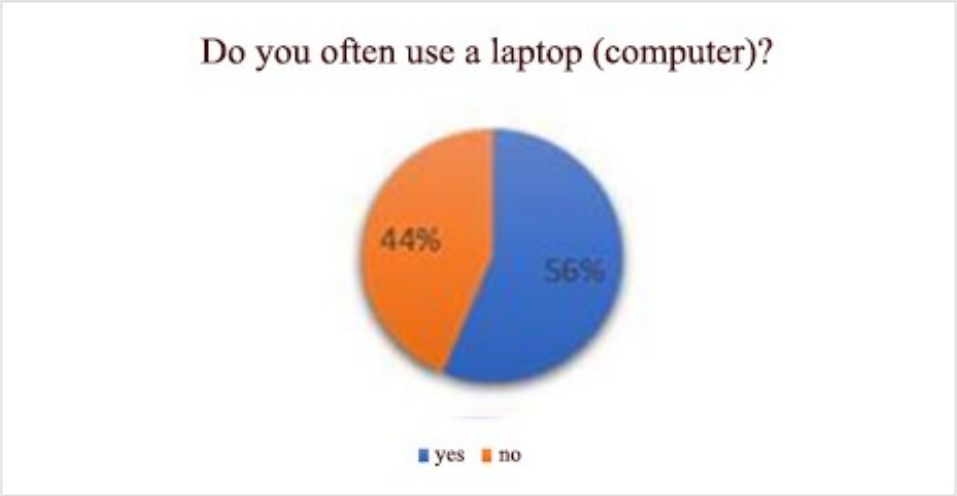

Figure 8. «Do you often use a laptop(computer)? survey results»

«With what you get the necessary information?» 92% of respondents said «smartphone», 8% indicated «book» (Figure 9). It is obvious that due to the advanced age of technology, most students resort to the help of this smartphone. Currently, it is advantageous for students to immediately look at the finished information from the internet. However, the data obtained from internet resources cannot be called reliable. Therefore, it is important to be able to compare and analyze the data in order to make sure that it is accurate. It is important to be able to read the book,

analyze the information received from it, and take possession of thoughts. This is because if the human brain does not process and differentiate the information it receives, it is likely to be forgotten as unnecessary information. In the presence of processed information, it is transferred to long-term memory and revived when necessary. The difficulty associated with long - term memory is the ability to search, select and find the necessary information in the mind. And there is so much information in our memory that it is impossible to quantify it. Even so, one cannot but be surprised that the necessary data comes out of our stock of consciousness in a timely manner [10-13].

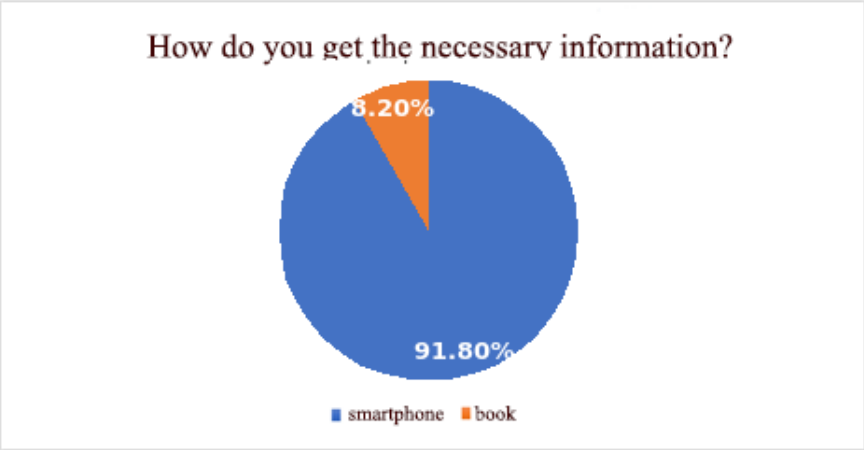

Figure 9. How do you get the necessary information? survey results

«How long can you remember the information you received?» 34% of respondents answered no more than a week, 28% no more than a day, 27% no more than a month, and 11% longer (Figure 10). That is, it can be said here that how long information remains depends on special memorization and involuntary memorization. In involuntary memory, a person does not set himself a special goal, does not use special ways of memorization. And special memory requires special techniques, and there are specific motives that cause it [14].

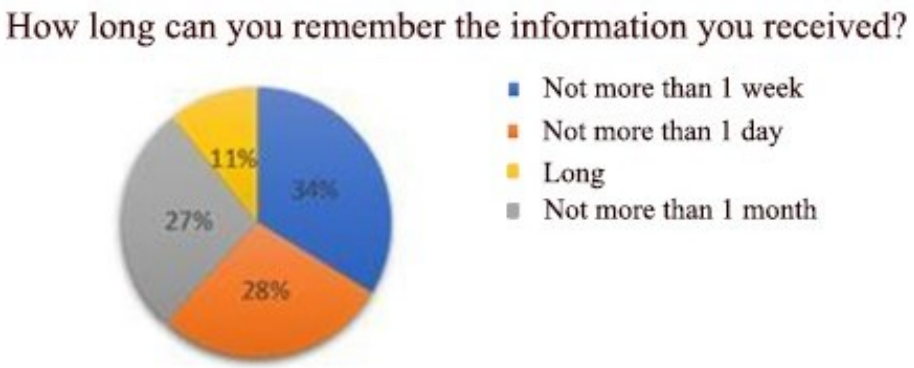

Figure 10. «How long can you remember the information you received?»

«In what format do you remember the information received in detail?» 47% of respondents said video format, 36% said text format, 10% said audio format, 4% said animation, and 3% said all formats (Figure 11). That is, the fact that a person remembers well-known information

depends on his perception. All mental processes are carried out in close connection with each other. This is due to the peculiarities of human perception. It should be noted that there are types of perception by sight, perception by hearing, perception by smell, taste, touch [15].

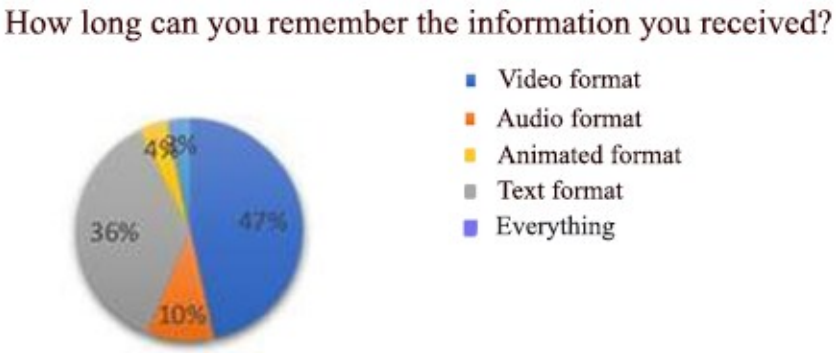

Figure 11. «In what format do you remember the details received?» survey results

«Books, newspapers, magazines, etc. How about switching your information resources to smartphone apps and internet resources?» 63% of respondents «don't mind», 19% «don't mind», 17% «difficult to answer», 1% answered differently. It was shown that the vast majority did not object because of the technological age. That is, it depends on the age of the respondents and their interests. Objecting participants can consider the indicated sources of resources not only as a source of information, but also as a way for people to relax. That is, the smell of a book that gives a person a pleasant feeling, the sound of a newspaper, magazine crackling is evidence that the program on the smartphone cannot be replaced (Fig. 12).

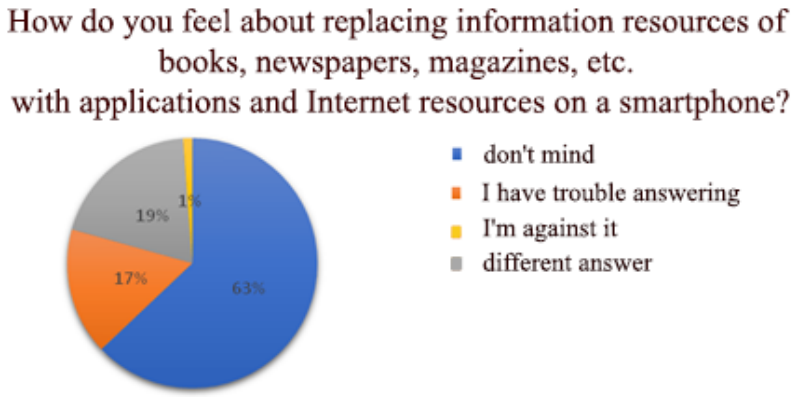

Figure 12. «How do you feel about replacing information resources of books, newspapers, magazines, etc. with applications and Internet resources on a smartphone?» survey results

Conclusion. In conclusion, it can be observed that the impact of modern technologies on the memory process of learners is not only negative, but also positive. Of course, if these technologies are not used effectively and beyond their scope. In most cases, only the initial result and the final result are paid attention to during the use of information technologies in the educational process in mathematics and programming. And the student's thinking process is not paid attention to. Therefore, in order to optimize the educational process, we need to intellectualize the information tools used in education. That is, it is clear that we should consider the creation of programs that make the educational process more efficient, managing these trends, in order for our

future generation to develop and grow in the right direction.

Список литературы

1. Bromwich D. Trapped in the Virtual Classroom // The New York Review of Books. – 2018. – July 9
2. Шаронин Ю.В. Цифровые технологии в высшем и профессиональном образовании: от личностно ориентированной smart-дидактики к блокчейну в целевой подготовке специалистов / Ю.В. Шаронин // Современные проблемы науки и образования. – 2019. – № 1. – С.201-218
3. Polanyi M. The Tacit Dimension. Garden City / M.Polanyi. – New York: Doubleday, 2018.
4. Radianti J, Majchrzak TA, Fromm J, Wohlgenannt I. A Systematic Review of Immersive Virtual Reality Applications for Higher Education: Design Elements, Lessons Learned, and Research Agenda. Computers & Education. 2020; DOI: https://doi.org/10.1016/j.compedu.2019.103778
5. Pinto M, Leite C. Digital Technologies in Support of Students Learning in Higher Education: Literature Review. Digital Education Review. 2020; URL: https://revistes.ub.edu/index.php/der/ article/view/26783 (accessed: 10.08.2020).
6. Santos H, Batista J, Marques RP. Digital Transformation in Higher Education: the Use of Communication Technologies by Students. Proce- dia Computer Science. 2019; 164:123-130. DOI: https://doi.org/10.1016/j.procs.2019.12.163
7. Hillmayr D, Ziernwald L, Reinhold F, Hofer SI. The Potential of Digital Tools to Enhance Mathematics and Science Learning in Secondary Schools: A Context-Specific Meta-Analysis. Computers & Education. 2020; 153:103897. DOI: https://doi.org/10.1016/j.compedu.2020.103897
8. Ding H, Homer M. Interpreting Mathematics Performance in PISA: Taking Account of Reading Performance. International Journal of Educational Research. 2020; 102:101566. DOI: https://doi.org/10.1016/j.ijer.2020.101566
9. Десфонтейнес, Л. Г Особенности подготовки специалиста сферы сервиса / Л. Г. Десфонтейнес // Экономическая наука и хозяйственная практика: современные вызовы и возможности кооперации теоретико-методологических и прикладных исследований : материалы Междунар. науч.-практ. конф., Самара, 31 марта, 2018 г. / Институт социально-экономических исследований, ООО НИЦ «Поволжская научная корпорация» ; редкол.: Р. Р. Галлямов [и др.]. - Самара, 2018. – С. 36-39.
10. Лукина, О. В. Некоторые итоги перехода на новые образовательные стандарты в образовательных учреждениях / О. В. Лукина, А. А. Курочкина // Качество науки - качество жизни : сб. материалов 11-й Междунар. науч.-практ. конф., Санкт-Петербург, 12 апреля 2018 г. - СПб. : Изд-во «ООО „ИД ТМБпринт“», 2018. - С. 137-141.
11. Assessment of the Influence of Human Factor on the Working Process Effectiveness as a Factor for Improving the Efficiency of Production Management at Industrial Enterprises / O. V. Voronkova [et al.] // Espacios. - 2018. - Т. 39, № 48. - С. 25
12. Desfontaines, L. G. The role of intellectual abilities in shaping manager’s competencies / L. G. Desfontaines // Components of Scientific and Technological Progress. - 2017. - № 3 (33). - С. 44—47.
13. The education world forum [Electronic resource]. - Mode of access: https://www.theewf.org/ research/2019/oecd-says-countries-should-use-global-mega-trends-to-prepare-the-future-of-education/. - Date of access: 01.03.2019.
14. Коровин А. Дети в сети, или знакомьтесь: Поколение Z [Электронный ресурс] URL: http://www.pravmir.ru/deti-v-seti-ili-znakomtes-pokolenie-z
15. Психологические особенности поколения Z. [Электронный ресурс] URL: http://mansa-uroki.blogspot.com/2016/04/z_12.html

References

1. Bromwich D. Trapped in the Virtual Classroom // The New York Review of Books. – 2018. – July 9
2. SHaronin YU.V. Cifrovye tekhnologii v vysshem i professional'nom obrazovanii: ot lichnostno orientirovannoj smart-didaktiki k blokchejnu v celevoj podgotovke specialistov / YU.V. SHaronin // Sovremennye problemy nauki i obrazovaniya. – 2019. – № 1. – S.201-218
3. Polanyi M. The Tacit Dimension. Garden City / M.Polanyi. – New York: Doubleday, 2018.
4. Radianti J, Majchrzak TA, Fromm J, Wohlgenannt I. A Systematic Review of Immersive Virtual Reality Applications for Higher Education: Design Elements, Lessons Learned, and Research Agenda. Computers & Education. 2020; DOI: https://doi.org/10.1016/j.compedu.2019.103778
5. Pinto M, Leite C. Digital Technologies in Support of Students Learning in Higher Education: Literature Review. Digital Education Review. 2020; URL: https://revistes.ub.edu/index.php/der/article/ view/26783 (accessed: 10.08.2020).
6. Santos H, Batista J, Marques RP. Digital Transformation in Higher Education: the Use of Communication Technologies by Students. Proce- dia Computer Science. 2019; 164:123-130. DOI: https://doi.org/10.1016/j.

procs.2019.12.163
7. Hillmayr D, Ziernwald L, Reinhold F, Hofer SI. The Potential of Digital Tools to Enhance Mathematics and Science Learning in Secondary Schools: A Context-Specific Meta-Analysis. Computers & Education. 2020; 153:103897. DOI: https://doi.org/10.1016/j.compedu.2020.103897
8. Ding H, Homer M. Interpreting Mathematics Performance in PISA: Taking Account of Reading Performance. International Journal of Educational Research. 2020; 102:101566. DOI: https://doi.org/10.1016/j.ijer.2020.101566
9. Desfontejnes, L. G Osobennosti podgotovki specialista sfery servisa / L. G. Desfontejnes // Ekonomicheskaya nauka i hozyajstvennaya praktika: sovremennye vyzovy i vozmozhnosti kooperacii teoretiko-metodologicheskih i prikladnyh issledovanij : materialy Mezhdunar. nauch.-prakt. konf., Samara, 31 marta, 2018 g. / Institut social'no-ekonomicheskih issledovanij, OOO NIC «Povolzhskaya nauchnaya korporaciya» ; redkol.: R. R. Gallyamov [i dr.]. – Samara, 2018. – S. 36-39.
10. Lukina, O. V. Nekotorye itogi perekhoda na novye obrazovatel'nye standarty v obrazovatel'nyh uchrezhdeniyah / O. V. Lukina, A. A. Kurochkina // Kachestvo nauki - kachestvo zhizni : sb. materialov 11-j Mezhdunar. nauch.-prakt. konf., Sankt-Peterburg, 12 aprelya 2018 g. - SPb. : Izd-vo «OOO „ID TMBprint”», 2018. – S. 137-141.
11. Assessment of the Influence of Human Factor on the Working Process Effectiveness as a Factor for Improving the Efficiency of Production Management at Industrial Enterprises / O. V. Voronkova [et al.] // Espacios. – 2018. – T. 39, № 48. – C. 25
12. Desfontaines, L. G. The role of intellectual abilities in shaping manager’s competencies / L. G. Desfontaines // Components of Scientific and Technological Progress. - 2017. - № 3 (33). - C. 44—47.
13. The education world forum [Electronic resource]. - Mode of access: https://www.theewf.org/ research/2019/oecd-says-countries-should-use-global-mega-trends-to-prepare-the-future-of-education/. - Date of access: 01.03.2019.
14. Korovin A. Deti v seti, ili znakom'tes': Pokolenie Z [Elektronnyj resurs] URL: http://www.pravmir.ru/deti-v-seti-ili-znakomtes-pokolenie-z
15. Psihologicheskie osobennosti pokoleniya Z. [Elektronnyj resurs] URL: http://mansa-uroki.blogspot.com/2016/04/z_12.html