

Секція 1. Інформаційні системи і технології

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AUTOMATED ATTENDANCE SYSTEMS FOR HIGHER EDUCATION INSTITUTIONS

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The development of information technologies makes it possible to implement various automated education systems. One of their tasks is to control the dynamics of the educational process of each of their participants and provide an objective approach to reporting on learning outcomes. One of such system's types is an automated attendance system. Such systems are used to keep records of students' attendance at classes.

The main task of such systems is to replace the manual filling of the attendance paper journal by the teacher with an automated process. The problem with manually filling out the journal, in addition to the human factor, is the time that the teacher spends on the survey and filling out the journal. Based on a survey conducted in Moroccan schools (from primary to high schools), in which 289 teachers participated, it turned out that teachers spend an average of 4-6 minutes on the task of filling out the attendance register with an average number of students of 32-36 per class [1].

This means that, given a 45-minute class, an average of 9-13% of the class time is spent filling out the attendance journal. In addition, the superintendents of these schools also spend 15-40 minutes processing the attendance data of 500 students. Thus, in addition to optimizing the educational process, the use of an automated attendance system also optimizes the administrative processes of an educational institution.

By utilizing different technologies, the automated attendance system receives the following data about students:

1. A specific identifier that can be used to recognize a student;
2. The location of the student at the time of identification;
3. The time at which the student was identified.

Processing this data and integrating the system with the database will automate the process of marking a student's presence. The database of the educational institution should have a schedule that indicates which group should be in a certain classroom at a certain time, as well as a list of students of these groups. All that remains is to compare the actual location of each student with their schedule to conclude whether they're present in class.

To implement an automated attendance system, a variety of technologies and methods are used around the world, for example:

RFID (Radio Frequency Identification) [2]. Each student carries a passive RFID tag (transponder), which is activated when it receives a special radio signal sent by a reader (transceiver). The electromagnetic wave induces a current in the RFID tag's antenna, which allows it to send a signal in response;

Wi-Fi Hotspot [3]. A specially developed application is installed on students' smartphones, which, when connected to the educational institution's Wi-Fi network, receives the smartphone's MAC address and transmits it to the server. The received MAC address is then compared with the database. If a match is found, the student is marked as present in class, otherwise, they're marked as absent;

Bluetooth [4]. iBeacons are installed in classrooms. Each of the beacons has encoded information, such as room name, room code, and what classes should be held in that room. A specially developed application is installed on students' smartphones, in which the student must log in. After authorization, the application will send the user a request to turn on Bluetooth. Once enabled, the app will scan the environment to detect the iBeacon. If the application identifies the beacon, the student's presence will be marked;

Face recognition technologies [5]. Cameras are installed in classrooms to take pictures of students. These photos are then processed by the server and compared with an existing database of student faces. If the face matches the database, the student's presence is marked;

Biometric systems [6]. Fingerprint scanners are installed in classrooms, and students have to put their fingers on them. The resulting fingerprint is compared with the existing fingerprint database. If the fingerprint matches, the student's presence is marked;

Scanning a QR code [7]. Using the application, the teacher generates a QR code that encrypts the time and name of the lesson. At the beginning of the lesson, the teacher uses a projector to show the QR code. Next, each student logs in to the app and scans this QR code. Then the information is sent to the server and the student's presence is marked.

The following system criteria were used to compare existing technologies: ease of scaling, smartphone requirement, technology reliability, teacher involvement, student involvement, and moderate equipment cost. The comparison of existing systems is shown in Table 1:

Table 1

Comparison of automated attendance systems technologies

Technology	Ease of scaling	Smartphone requirement	Technology reliability	Teacher involvement	Student involvement	Moderate equipment cost
RFID	Yes	No	Yes	No	No	No
Wi-Fi	Yes	Yes	Yes	No	Yes	Yes
Bluetooth	Yes	Yes	Yes	No	Yes	Yes
Face recognition	No	No	No	No	No	Yes
Fingerprint	No	No	No	No	Yes	Yes
QR code	Yes	Yes	Yes	Yes	Yes	Yes

Conclusions. To fully automate the process of marking students' attendance, options where neither students nor the teacher are involved in the process should be considered. Table 1 shows that such options are RFID and face recognition technologies. The disadvantages of RFID technologies include the cost of the necessary hardware, as each student needs to be issued a transponder and each classroom needs to be equipped with special readers. While facial recognition technology does not have such problems, its implementation and scaling are quite inconvenient, as it is necessary to form a database with the faces of each student, and this system may not work reliably at the stage of recognizing a photo. Therefore, it can be asserted that an automated attendance system in higher education institutions should be built on the basis of RFID technologies.

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ROLE OF INFORMATION TECHNOLOGIES IN PSYCHOLOGICAL ASSISTANCE OF THE MILITARY

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The growing concern about mental health issues ultimately draws attention to the appropriate problems in Ukrainian society and finally has started to remove slowly the stigma from this aspect, including the efforts of the National Program of Mental Health and Psychosocial Support initiated by the First Lady O. Zelenska [1]. Along with the organizational and information resources, attention should also be paid to the technological resource. The application of information technology in healthcare not only develops the field of medical IT but also improves and accelerates the collection of necessary data.

The military who experience psychological difficulties as a result of prolonged participation in active combat operations are one of the most vulnerable target groups for psychological assistance. According to the survey of Gradus Research, 39% of respondents (n=2100) from different cities in Ukraine believe that participation in combat operations is a sufficient reason to seek psychological help, while 51% of the respondents believe that military participating in combat operations are the ones most in need for psychological help along with those who have lost loved ones due to war [2]. Moreover, the male part of the population is much more passive when it comes to recognizing the need and seeking psychological help, given the overwhelming majority of men in the Armed Forces of Ukraine. Consequently, we have a gap between the actual and potential demand for psychological assistance for the military.

According to the research findings, between 20% and 40% of the military population are in need of psychological assistance, which would primarily help to relieve the symptoms of post-traumatic stress disorder (PTSD) [3]. However, among

other things, the difficulties lie in the low level of information support for the study of this problem for a number of reasons:

- low level of personal initiative to seek psychological assistance;
- low prioritization of recognizing the psychological state of subordinates for military unit commanders;
- insufficient number of military psychologists per unit to administer psychological tests and conduct on-site research;
- obtaining information from non-clinicians (volunteers, journalists) who are unable to identify signs of acute stress disorder or PTSD;
- insufficient level of independent (remote) access of the military to psychological assistance resources, including the first aid protocols or TRiM;
- lack of technical and informational means of obtaining information;
- specific prolonged nature of PTSD manifestation;
- other complex reasons.

Among other things, using information technologies could help to provide information to the target audience and collect data from the military as the respondents for the evidence base of mental health research, including the patient data in terms of ergotherapy. They enable the collection, storage, processing, and transmission of large volumes of data on psychological state in various formats. With the appropriate advancements in technology, mental health providers, psychologists, and other related practitioners can utilize sophisticated tools and systems to manage and deliver psychological assistance to the intended recipients. Taking into account the significant time limitations of delivery of information flows from the military, the confidential character of personal data and their geolocation, heterogeneous cyclicity, and the individual nature of potential or diagnosed psychological trauma experience, the use of information technologies will allow to quickly obtain data and ensure a qualitative display of their heterogeneity.

The need for constant and maximally regular information flows from the military in the framework of supporting their psychological state and mental health can be provided by information technologies to:

- deliver primary psychological help on individual requests;
- provide information support for mental self-care, including TRiM;
- apply mental telemedicine activities with both preventive and therapeutic purposes;
- conduct, transfer, and process psychological tests with or without the participation of the line commanders;
- recognize and measure the emotional tones of content in typical military-oriented social groups or channels of social networks;
- develop the data-driven approach to therapy;
- provide mental healthcare apps and platforms, etc.

One of the key roles of information technologies in psychological assistance for the military is to ensure data accessibility. Through databases, cloud storage, and data management systems, information technologies enable both psychologists and the military to access and retrieve relevant data quickly. This accessibility promotes direct collaboration (depending on the military's access to the Internet) and well-informed decision-making for mental healthcare research organizations and researchers. Moreover, sometimes only remote communication channels make it possible to quickly and reliably receive data from the military, whose units are located in the red or gray zones. This enables real-time data delivery and supports collaboration.

In the conditions of active information war, an important aspect of use IT as a psychological assistance tool is the enhancement of data security and privacy. Robust encryption techniques, access controls, and authentication mechanisms safeguard sensitive data from unauthorized access and ensure compliance with privacy regulations. Data delivery systems also often include audit trails and logging mechanisms to save sensitive data access and usage.

Overall, IT has significant and underestimated potential to revolutionize mental healthcare and in particular psychological assistance for the military by increasing access to mental healthcare services, improving data-driven decision-making procedures, and promoting mental health education among the military. By embracing technological advancements, psychologists can better meet the needs of the military on on-site service, prolong their therapy, and contribute to improved mental well-being on a larger scale.

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