The Application of Information and Communication Technologies in Dance Sport in Bosnia and Herzegovina

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Abstract: The research was performed with the aim of determining the frequency and ways of application of information and communication technologies (ICT) in dance sport in Bosnia and Herzegovina. The research was conducted on the sample of 33 dance clubs, that is, their representatives, with the condition for the clubs to belong to one of the two national dance associations of Bosnia and Herzegovina. The data were collected via interviews, associations' web pages and their archives. The research utilized analysis and induction method. The results showed weak application of ITC in everyday work of dance clubs, but they also indicated the appropriate usage of ICT by dance associations (as the "umbrella" organizations of dance sport) at dance competitions. In this sense, it is advisable to steer finances towards improvement of dance clubs' equipment and IT training of employees.

Key words: information and communication technologies, dance sport, application.

Introduction

Sport is characterized by a multitude of interactions involving so much information that human brain cannot memorize, compare and analyze it all in a fast and effective way. Modern ICT have become an integral part of everyday life of individuals and groups in all areas of human activity. It can be stated with certainty that this is a phenomenon of globalization which enables fast, safe and transparent flow of information. A long time ago in 1983, Paul Westhead, American basketball coach of LA Lakers, said that "we are just scratching the surface" [13] when it comes to informatization; today, informatization in all life spheres and in the work of kinesiologists is to be accepted as inevitable and as such it should be supported [6]. Information technology accelerates overall social progress, where sport is also one of the more significant factors [17]. According to available statistical data, the number of Internet users in Bosnia and Herzegovina has been steadily increasing; it was 65.36% in 2012, as compared to only 1.08% in 2000. Considering the numbers, Bosnia and Herzegovina is a regional leader in the Internet use (Croatia 63.00%, Serbia 48.10%, and Montenegro 56.84%) [9].

In the Sports Law of BiH [21], IT in sport is mentioned as an activity related to the professional sport (Article 45i). In this manner, a legal directive is given with the following goals to strive for: systematical monitoring and recording of the situation in sport, professional, scientific and publishing activities through the organization of the universal information system in sport, which should be built according to the European standards of the sports information network. The elements of the universal information

system in sport are more clearly defined in the Article 142 of the Sports Law of Republic of Srpska [22], and these are related to basic registration of members, sport facilities, sport experts, experts in sport, athletes, sport results, financial management, and so on.

Unlike other technologies which are supposed to follow the development of a certain sports branch and discipline, the application of ICT in them has happened relatively quickly, and these technologies have become a vital part of dance club organization, associations and competitions. Information technology, programs, staff, organizational conditions, and structured IT activities are all necessary components for the existence of information system [14]. Information system in sport entails information support system for sport organizations, support system for decision making and system for communication, cooperation and individual work [20] [16].

Development of training technology in sport is directly related to the development of information technologies, which are part of organizational changes in sport. These changes are defined by the following factors: environment, knowledge, learning and management [18]. Information and communication technologies are increasingly present in higher education as compared to traditional learning methods [11]. In his research on modeling of the support system in decision making process related to athlete's preparation, Havaš (Havaš et al.) deals with development of telematics system based on the current potential of an athlete, information feedback in a database and data storage in this system [8]. The application of information and communication technologies in dance clubs is primarily connected to the needs of business management, training process and dance competitions. However, it can be used in much wider context (production technology of dancing costumes and shoes, booking of airplane tickets, sales of tickets for competitions, exchange of experts' opinions, etc). Scientific dance research is unimaginable today without the application of ICT, considering that it involves a large amount of data and different descriptive and comparative statistical procedures.

The aim of this study is to determine the frequency and ways of application of information and communication technologies in dance sport in Bosnia and Herzegovina.

Method

This research utilized methods of analysis and induction. The data for the research were collected via official websites of dance clubs and from the archives of the Dance Sport Association of BiH, Modern Dances Association of BiH, and a dance club "Gemma" from Banja Luka, as well as through interviews of representatives from the aforementioned dance sport organizations.

Results and discussion

On the basis of the analyzed data that were collected from the two main dance associations, there are 32 dance clubs registered in Bosnia and Herzegovina which are characterized by the following: 8 clubs have a website; they all have a profile on one of the social networks (Facebook, Twitter), 9 clubs have a computer, and only one dance club has a software support system with a database containing members' information and necessary files (Table 1). These data indicate the low level of IT (hardware and software) support in dance clubs in BiH. It can be asserted that this result was expected, considering the general socio-economic situation in the country, and thus, in sport. Likewise, these data show that only a small number of clubs has necessary logistic support which led us to conclude that the external environment is not well informed about club activities. On the other hand, judging by the ITC presence, it seems that the internal awareness of the club activities is satisfactory, especially if one has in mind internal stakeholders of dance clubs [19].

When the aforesaid is regarded in a broader perspective, it has been noticed that the ministries of sport in two Bosnian entities are relatively well equipped with hardware; nonetheless, their universal information system does not have efficient software, so if there is a need for certain information (information that is useful for professional development and existence of sport organizations as main agents of sport system in BiH), its inadequacy and inaccuracy of available information becomes evident. Even

though, the elements of universal information system are outlined by law, however, subordinate legislation does not offer precise enough or systematical plan for standardization of the recording operations and procedures. For this reason, dance clubs are unaided when it comes to creation of databases. Taking into account this aspect of sports management, the enormity of the gap between dance sport and sport in Bosnia and Herzegovina and world standards is clearly seen from the fact that as early as 1983 there was only one sport organization in San Francisco without IT support in business management (for ticket sales, scouting or statistical analyses) [13].

Through the research of dance clubs in BiH, it was found that dance clubs have relatively young managing executives (33.81 years old), who perform tasks in different roles (managers, coaches-operating managers, administrative staff, finances).

All dance clubs' representatives stated that they use computers with Windows operative system regularly in their work to maintain the club functioning. Programs being used by them are Word, Winamp, and Acrobat Reader (28 clubs or 87.5%), and a smaller number of them said they use Excel, WinZip, Power Point, Acrobat Reader, JPEG, Corel Draw and Tif (7 clubs or 21.45%). For the bookkeeping purposes all dance clubs have contracts with accounting bureaus, which have their own licensed bookkeeping program, thus providing them full software support.

Only one dance club has software support for its everyday operations (Table 1). The interview with the IT administrator of the dance club "Gemma" Banja Luka revealed the basic information about the software, its functions and architecture of the application. The program has been used for two years by all employees in the club (all management levels). The software functions as a network application with the central database, and the employees have access to it through their accounts. The application access is enabled from any computer inside the local network that is installed in the club's premises. The basic version of the software has the following functions:

- Free creation of user accounts for access: tutor, administrator (account creation, deletion, deactivation);
- Limitation of access depending on the type of user (different users have different interface

Table 1. The application of information and communication technologies in clubs in BiH entities

City	Dance clubs	Websites	Social network profile	Computers in club	Software support system
Banja Luka	4	2	4	2	1
Sarajevo	5	1	5	3	-
Cazin	1	-	1	-	-
Tuzla	3	2	3	2	-
Bosanska Krupa	1	-	1	-	-
Mostar	4	1	4	1	-
Teslić	1	-	1	-	-
Bihać	1	1	1	1	-
Srbac	1	1	1	-	-
Zenica	4	-	4	-	-
Trebinje	1	-	1	-	-
Sokolac	1	-	1	-	-
Bijeljina	1	-	1	-	-
Pale	2	-	2	-	-
Lukavica	1	-	1	-	-
Gračanica	1	-	1	-	-
Republic of Srpska	12	3	12	2	1
Federation BiH	20	5	20	7	-
Total	32	8	32	9	1

and therefore limited access to certain program functions);
- Work with users' profiles: tutors and members (data entry, deletion, updates);
- Creation of members' groups and appointment of a tutor for each group;
- Log-in and log-out records of all users;
- A list of log-ins/log-outs/presence of all users accessing the system;
- Members' salary management (payments entry, overview, deletion, other changes).

The software has the following reports ready in its program, as well as export of each report as a PDF file:
- Members: members' list, log-ins, their presence in groups and with different tutors, view of payments, date of entries and payments. Each report also includes additional search criteria (sex, age).
- Tutors: list of all tutors, their log-ins. Each report also includes additional search criteria (sex, age)
- Payments: list of payments for each member, delays, dates.

Aside from these basic functions, the software has additional functions:
- Sending of emails to members/tutors by different criteria (cancellation of scheduled activity, change of schedule, and various other information);
- Sending of text messages to members/tutors by different criteria (cancellation of scheduled activity, change of schedule, and various other information);
- The accessibility of program from the outside via Internet (the access enabled to members so that they can view their profiles, payments, and such);
- Automatic notifications to administrators/tutors about members' overdue fees.

The application was created via Java technology, while the database itself uses MySQL server. All software used by clients is free after installation and there is no need for purchase of additional licenses. The most important hardware requirements of the 'server' computer with the installed application are processor, RAM memory and free space on the hard disc: CPU Intel/AMD on 2GHz+ (the processor should preferably be multi-core), RAM 2GB+ and minimum space on the hard disc 2GB+.

Hardware requirements of other computers which could also be used for accessing the application, are not so important and 'the average' computer is sufficient. It is a network type of application set in the central computer together with the database. It is also possible to access the application from the outside via Internet. There is also a local network, so that one can access the application from other computers, and for data backup, there is an additional memory in the form of stick/external disc/other computer.

Naturally, the application of this software requires a computer literate user, which is in accordance with the labor market research in Bosnia and Herzegovina [1], where 24% of the employers stated that there is a lack of necessary IT knowledge, skills and training (general and specialized knowledge about different program packages).

Application in the training process

A large amount of information that trainers operate with every day is, to a large extent, based on the previous experience and knowledge of experts and is stored in databases. The mobile phone networks with their multimedia functions are especially significant today for the information flow. Many sports branches and dance use very much computer animations of different movements to help visualization of movements [4] [12] [10] [3] [7] [2]. Biomechanical uninvasive diagnostics based on the use of ICT is greatly used in numerous sports branches, but not in dance. Thus, for example, computerized isokinetic diagnostics can determine potential weak spots and muscle forces for different flexing and extending movements. This type of diagnostics is merely used therapeutically when it comes to dancers in BiH, that is, only when they are already injured.

In relation to psychological preparation of dancers, modern technologies enable dancers to get acquainted with images, sounds and atmosphere of a competition where they would be performing. You-

Tube channel is especially important in regards to this, as it enables dancers from BiH, who are mostly inexperienced in world competitions, to see the top quality world dancers. For example, dancers used to wait for years to see other top dancers, or perhaps they did not see them at all, while today that is almost impossible and they can even say that they know them virtually through social networks. It is certain that social networks increased flow and exchange of information among dancers and they are an essential factor of socialization in the process of globalization.

Dancers are shown videos of top dance couples from competitions and their own videos from trainings or competitions for the purpose of visualization, indication of mistakes, and self-evaluation. This constitutes an integral part of technical, tactical, choreographic and psychological preparation in dance. Digital cameras, LCD projectors, DVD players and USB sticks are used for this purpose. Other than for demonstration of dance elements, modern technologies are also used for: monitoring of each athlete's qualities and abilities (sports diagnostics), timely changes of plans and programs (planning and programming), realization of training tasks and evaluation of training effects and so on. Based on the acquired information in this research (via interviews), a conclusion can be drawn that ICT as a part of methodical and methodological procedure in training is used very rarely. One reason for this could be that dance sport employs relatively young couching staff (young coaches in dance clubs), and that they have a great ability to demonstrate dance elements; on the other hand, it is obvious that most dance clubs are not well equipped technically in order for them to use this instruction method. Some experts' opinion is that a dance couple being photographed while performing dance choreography must display clearly defined posture in each captured moment (their posture, position of arms and legs, body line, movement).

It is almost impossible to have dance training without music, which is usually stored on some external memory (DVD, CD, USB stick, Internet, external hard disc, iPad, iPod); these, in any case, are more functional and durable than those vinyl records and cassettes from the past era. Modern devices for music reproduction have a rhythm control option (slowing down and accelerating), which is used a lot in teaching of new dance elements and choreographies, regardless of the teaching method (analytical, synthetic and combined).

ICT cannot replace specific composition of movement (5), that is, the coach and his/her living word, creativity and originality in application of different work methods, nevertheless, ICT make a great support in the training process.

Application in dance competitions

The analysis of dancers while they are performing in a show or competition is nearly impossible without the appropriate ICT support, considering the artistic aspect (expression of emotions, presentation, rhythmic interpretation, originality and expressiveness). Modern technology helps to a great extent with determination of prescribed parameters to structural basis of dance: music rhythm with a certain number of dance measures in a minute and duration of music, sound, acoustics and light effects and lighting of a dance floor in general. So, for example, typical "scoreboards", which are used at sport matches, are not used in dance sport competitions.

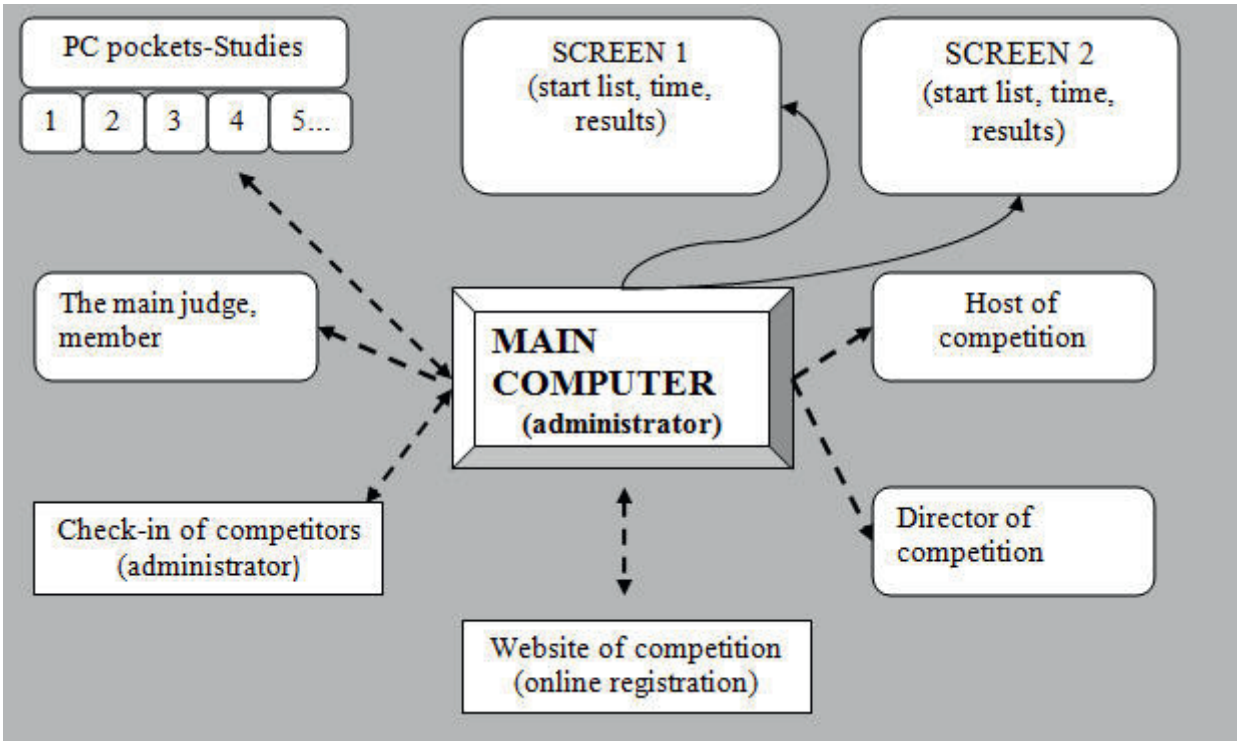
Dance sport competitions are characterized by very long duration (they usually start in the morning and end late in the evening), with a lot of different age categories (juveniles 1, juveniles 2, juniors 1, juniors 2, youth, seniors, veterans), qualitative groups (A, B, C, D, E), and disciplines (dance couples, formation dance, and Latin and standard dances). When it comes to modern dance sport, the situation becomes even more complex, because there can be anywhere from 500 up to 1000 competitors per day. This means that the process of competitors' registration and checking out, work hours and analysis of results are extremely demanding. On top of this, data analysis of sports results follows a specific set of rules (Dawson's rules) demanding specifically educated human resources (there is a special exam to be taken for this in dance associations). Thanks to software solutions and technological advancement, this process is much easier, so preparation and reaction time to frequent changes during dance competitions is relatively short. All dance competitions (in both

dance associations in BiH) utilize a software system for registration of competitors and analysis of results, and owners of the software are dance associations.

There is one particular dance program which is featured in dance sport in BiH (it is the only one currently featured in BiH, and it is also typically used in ex-Yugoslavian region). The owner of the program is a company called Mastersoft from Niš, and basic information about this program was recorded in the interview with their representative. The program can track 999 different competitions during one tournament, and it can perform different operations with the equal number of competitors. If the organizers require, marks for 3-15 judges may be entered into the program (there is always an odd number of judges in dance competitions). Judges can write their marks on paper or enter them into their PC pockets (PDA), and on PC pockets they can also view categories and disciplines that they are judging. It is possible to announce start lists by different categories, results, and timings on maximum three screens and video projectors. All data are sent from the computer (it has to be online), which has a specially designed software, managed by a professional trained for that purpose especially. All mentioned data can be available to both the host of the program and competition's main judge on his/her laptop which is connected to the main computer. At the end of a competition, the results are sent via Internet as HTML directly to the website of associations. For online registration of competitors, there is a specifically created program which is compatible with the main program that is used for analysis of results, so by a single click, administrator can automatically generate the start list (the attempts are made to distribute start numbers evenly across clubs, countries or quality). On the day of competition all registered competitors check-in on a special computer which is connected to the main computer used for analysis of results (Graph 1).

The program has the ability to print diplomas, start numbers, and a bulletin with all data, judges, participants and results of competitions; it can also store information and generate dancers' rang list according to the predetermined scoring criteria stated in the book of rules for competitions. The most recent function of the program enables one to play music

GRAPH 1. COMPONENTS OF THE PROGRAM FOR ANALYSIS OF A DANCE COMPETITION RESULTS AND COMMUNICATIONS



Explanation:

wireless connection (two ways), wireless connection (one way), cable connection

for a certain dance act in modern dances, and this is possible if a competitor sends music together with its online registration. The installation of the program is not very demanding (Win 5 or Win 8), the application was created via several technologies (Visual basic EVB for PDA, Visual basic, Visual C# - basic program and other segments - host, screen, division), the application for online registration (HTML, PHP, JS), and the part for android smartphones or android tablets was created in Android OS. The World DanceSport Federation (WDSF) certified the program and it is one of the eight programs which are currently used in the world.

Conclusion

Based on this research, it can be concluded that technological equipment of dance clubs in BiH is at a low level implying furthermore insufficient software support. This condition can be linked to unfavorable financial situation in sport and in society as a whole. All dance clubs in Bosnia and Herzegovina are present on social networks and they probably use them to inform their members (internal public) about activities, nonetheless, the non-existence of websites can be a reason why broader public is uninformed and why there is weak popularization of dance in general. Unless they have a computer in the club, managers of dance clubs probably use their home or work computers (or from other place) to perform everyday tasks in a dance club. The necessity for ICT in dance is great because ICT are used on a daily basis by all management levels in a dance club.

The research verified that only one dance club has a software support system that is used for its everyday operations. The program is utilized by all business sectors in the club (administration, management, finances and coaches) and it could serve as a design model for some future similar software that would be used for the operations of dance and sports clubs in general. The application of ICT in the training process is chiefly related to the diagnostic of anthropological characteristics and abilities, and also related to this is planning, programming, realization and evaluation of the training process. The integral part of each dance training is music, which is reproduced from external memory devices. In dance training, ITC have been used in visualization of dance movements, choreographies and introductions, as well as for the self-evaluation of own dancing.

All dance competitions have software support owned by associations, which makes organization of competitions much easier, considering the number of participants, categories and disciplines. Only two administrators work on registration of competitors, timing, analysis and announcement of results during competition and on associations' websites, printing of diplomas and competitors' rang list.

With all this said, it can be concluded that the application of ICT in dance clubs in Bosnia and Herzegovina is insufficient and unsatisfactory, having in mind legal, market, and professional demands in dance sport. Contrary to this, dance competitions are completely supported by ICT, so it can be asserted that in this area there is a full ICT support. The existing software solutions which are used in dance sport in BiH are simple, but they entail previous education and a certain level of computer literacy. All work programs in the club and associations are functioning with minimum technical requirements and with the Internet connection.

In the future, the focus should be on getting the attention of authorized institutions on dance clubs so that they provide them with computers and basic IT equipment, on creation and application of software programs for everyday work and staff training for the work with ICT.

Authorship statement
Author(s) confirms that the above named article is an original work, did not previously published or is currently under consideration for any other publication.

Conflicts of interest
We declare that we have no conflicts of interest.

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