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It-driven training system for referees in martial art kobudo

Просмотр Редактировать Отслеживать Перевести

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Background. Refereeing service quality is ranked high on the lists of priority problems in many modern sport disciplines as confirmed by many competitive experiences, with the service quality being most critical in the sport disciplines where the competitive performance is scored by expert/refereeing teams rather than impartial technical tools. Oriental martial arts formally certified by the national government may be ranked among such disciplines. Oriental martial arts competitions are normally classified into a few events/ programs, with some of them including bouts with sets of technical actions (Kata); and with the referees taking decisions and scoring every action based on the valid rules of competitions. It should be emphasized that the oriental martial arts referee is given a very limited time for decision and, hence, the decisions need to be made in a virtually automatic manner. This means that the referee training and excellence system to ensure the service quality plays a special role in this sport discipline.

Modern interactive computer technologies may be viewed among the most promising and effective ways to improve the referee training and excellence system. Presently the IT developments are increasingly applied in many sports [2-4] with a regretful exception for Kobudo. We believe, therefore that it is a high time to offer a modern IT-driven referee training and excellence system for Kobudo sport.

Objective of the study was to develop and test benefits of of the Rules of Competitions and Refereeing Service in Kobudo application software in practice.

Methods and structure of the study. The study was completed at the Modern Information and Communication Technologies for Application in Physical Education and Sports (PES) Research Laboratory of the Physical Education, Gymnastics and Life Safety Theory and Practice Sub-department of the Udmurt State University's Physical Education and Sports Institute. The application software for the purposes of the study was designed using the latest version of the universal data processing system analyzed in [1].

For these purposes, we collected a database of actual competitive situations captured on video in the top-ranking competitions including the European Championship, Russian Championships, Russian Cups, and regional (Volga Federal District) tournaments and cups. These competitive data were used to form a library of competitive situations including the following categories:

- · Key elements of competitions: athletes' coming-out ceremony, scoring procedure, nomination of winners;
- Sign language of the referees and corner judges in bouts;
- 50 typical fight situations;
- 35 sample competitive performances in Kata; and
- 25 sample competitive performances in Taiho Jutsu Kata.

The sample fight situations and competitive performances were selected and scored by an expert team of three first- and national-class referees, with the decisions taken by a simple majority vote of at least two experts. Situations with three conflicting decisions were omitted and replaced by the new ones. The Rules of Competitions and Refereeing Service in Kobudo System offers comprehensive tools for the trainees including: data processing and presentation tools; training machine; knowledge and skills tests tools; and an expert service toolkit. The System design includes the following key modules visualized on Figure 1:

(1) <u>Rules of competitions</u>: This module gives the valid rules of Kobudo Oriental martial arts in a hyper-textual format with a multimedia toolkit for figures, diagrams and video clips. The module makes an emphasis on the valid rules of competitions, refereeing service requirements and rules of competitions in specific events/ programs. A beginner referee shall perfectly know materials of the module to pass the theoretical knowledge test.

Figure 1. Head page of the System

(2) <u>Theoretical knowledge test</u>: This module provides a practical toolkit to test the trainees' competency in the following three key components of the rules: rules of competitions; sign language of the referee and corner judge (see Figure 2); and rules of competitions in Kata. The componential design of the module simplifies the progress tests and self-tests in the training process.

Figure 2. One of the optional test windows with a video clip and check options

When studies of the rules of competitions are completed, the trainees' knowledge of the latter is tested in every section, with most of the rules-related questions complemented by questions on the competition design and management system. On the whole, the bank of test questions offers 155 tasks with optional (one or few)

responses. The final test offers 20 tasks that shall be solved in 20 minutes. When the theoretical module is completed and the knowledge is tested, the trainee gets an access to the next module.

(3) <u>Training for practical refereeing service</u>: This module gives knowledge of the refereeing service practices with extensive materials to facilitate the practical refereeing skills mastering/ excelling process. It covers every aspect of the refereeing service including the fight refereeing (see Figure 2), technical events servicing and the refereeing secretary service.

Figure 3. Analysis of a referee's decision in the fight situation

(4) <u>Practical skills test</u>: This module is designed to rate the beginner referees' ability to take decisions in real competitions, with every fight situation scored in the roles of corner judge and referee. The corner judge must take a decision having only a fight video, with the optional responses decisive for success of one of the fighters. The referee must take a decision based on his own vision of the situation plus decisions of the corner judges as indicated in the task. The System randomly selects 10 tasks of the 50 available in the database and gives 10min for solutions.

Refereeing service in the technical events Kato and Taiho Jutsy Kato implies the competitive performances being rated by the referee. The beginner referees are offered to rate the competitive performance as poor, mean and high. Having mastered the competitive performance rating, the referee would start scoring the performance in points with the accuracy of 0.1. In view of the existing scoring system being highly subjective, the trainee's response is deemed to be right when differs from the consolidated expert opinion by ± 0.1 at most. The System offers 10 test tasks and gives 15min for solutions.

(5) <u>Final test:</u> This module is applied to test the final knowledgebase and practical skills of the beginner referees by the theoretical knowledge (155 tasks on the whole) and practical skills (240 tasks) tests i.e. 395 tasks on the whole. An individual final test includes 30 randomly selected tasks.

Results and discussion. The newly developed computerized Rules of Competitions and Refereeing Service in Kobudo System was applied to test active referees from the Kobudo Martial Art Federation of the Udmurt Republic, with the sample being widely varied in the background trainings, practical experiences and formal qualifications/ classes. Sampled for the new system testing experiment were 1 Class II referee, 7 Class III referees, and 4 junior referees (n=12). Benefits of the new system were rated by the pre- versus post-training tests of the sample, with the excellence training taking one week. The sample competency and skills were rated by the relevant modular databases. The referees' competency and skills were tested on an integrated basis on the following conditions: (1) Every System user was fully protected from a pressure from the management and other parties; (2) Test video clips were played only once in case of a Kata performance; and 3 times in case of a Kumite performance; (3) Neither snapshots nor slow motions were allowed in the tests.

Given on Figure 4 (a) and (b) are the results (in percentage terms) of the theoretical knowledge tests and practical skills tests (respectively) of the Kobudo referees from the Udmurt Republic. The pre- and post=training integrated test rates of the sample were estimated at 63.1% and 74.8%, respectively – that may be interpreted as indicative of the sample progress and, hence, the training system benefits. The difference of the test data arrays were found statistically significant by the Student t-criterion, with $t_p = 9.1$ and p < 0.05.

a)

Figure 4. Theoretical knowledge (a) and practical skills (b) tests

b)

Conclusion. Practical test of the newly developed computerized Rules of Competitions and Refereeing Service in Kobudo System in application to referees from the Kobudo Martial Art Federation of the Udmurt Republic **showed the pre-training** competency **and skills of the sample being deficient in fact**. The post-training tests showed a meaningful progress of the sample in the refereeing competency and skills. We believe that the benefits of the new system may be made accessible to a broad refereeing community if and when an online version of the system is offered to advance competency and skills of the active referees specialized in Kobudo oriental martial arts.

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Objective of the study was to develop and test benefits of the Rules of Competitions and Refereeing Service in Kobudo application software in practice. For these purposes, we collected a database of actual competitive situations captured on video in top-ranking competitions. The fight situations and competitive performances were rated by an expert team of three first- and national-class referees. Based on the study data and analyses, we offered the new referee training system including the following modules: (1) rules of competitions; (2) theoretical knowledge tests; (3) training for the refereeing service; (4) practical skills test; and (5) final test. The system is supported by a multimedia version of the rules of competitions, training guidelines and test materials. The new software was used for the competency and skills tests of the beginner referees certified by the Kobudo Martial Art Federation of the Udmurt Republic; and the tests detected some deficiencies in their knowledge and skills. The new computerized training system piloting experiment showed its benefits as verified by the notable progress in the knowledge and skills demonstrated by the beginner referees.



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