Technical Note

Development of a database for educating athletes in university sports

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Abstract. [Purpose] The aim of this study was to investigate the development of a database and system for easily creating documents for educational guidance on a personal computer and to assess the efficacy of such a system. [Participants and Methods] Thirty-seven athletic trainers of students who belonged to an athletic department participated in the study. We used FileMaker Pro 17 Advanced for document creation, and data on independent exercises for athletic rehabilitation were used for database creation. The participants created educational documents for the athletic rehabilitation of ankle sprains using paper media and this system. We surveyed the following items and compared them between the groups: 1) time taken to create the documents, 2) difficulty of creating menus for educational coaching, and 3) the potential for ongoing provision of self-training menus. [Results] The preparation times for creating the rehabilitation menu were significantly lower using the database than using paper media. As a result of the questionnaire survey, we found that using the database was significantly better than using paper media in terms of ease of menu creation and the potential for ongoing provision of self-training menus. [Conclusion] Our results suggest that educational coaching for rehabilitation using a database would be valuable for student athletic trainers.

Key words: Education, Database, Athletic rehabilitation

(INTRODUCTION

The Japan Sports Agency sees universities’ sports resources (students, coaches, researchers, facilities, etc.) as having great potential power in areas such as developing people who can contribute to society, stimulating the economy, and contributing to communities1). It states “the promotion of University sports” as one of its policies. This background led to the establishment of the Japan Association for University Athletics and Sport (UNIVAS) in 2019. Thus, the promotion of university sport is seen as advancing the effective use of universities’ resources. Student athlete trainers (ATs) are valuable resources of universities, supporting injury prevention, the enhancement of athletic performance, and return to play. From the above perspective, raising their quality can be seen as a necessary element in raising the value and athletic ability of university sports. In short, the student ATs belonging to university clubs must be provided with diverse extensions to their ability, to expand and enhance the support they give to their teams.

Ahead of this research, we conducted a questionnaire survey of 37 student ATs (the participants of this research) about their activities with the teams to which they belonged. The number of days subjects participated in such activities was 3.9 ± 1.4 times per week, with 44% of them participating three or fewer times per week. These results suggested the need for multifaceted support methods, including educational coaching to encourage self-management, and remote support. Asked about

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the necessity of “educational coaching™”, including aspects such as self-exercise coaching, all the student ATs responded that it is “important”. On the other hand, “educational coaching™” was only actually performed in 40% of cases. On the question of why they do not perform educational coaching despite feeling it to be necessary, 78% responded “lack of knowledge”, 16% responded “can’t find enough time”, and 5% responded “it takes time and effort”. The above indicates that educational coaching to players by student ATs is necessary, and the student ATs recognize that necessity, but implementation is lacking for reasons such as lack of knowledge and the difficulty of finding the time to prepare and deliver guidance. The survey of the activities of university student ATs by Hanaoka et al.3) found that although 87% were responsible for the role of educational coaching, only 20% of them put it into practice. In addition, few student athletes have strong self-management abilities4).

Therefore, to solve these issues by targeting the student ATs who support athletes, the aim of this study was to investigate the construction of a database and of a system for easily creating documents for educational guidance on a PC, and the efficacy of such a system.

PARTICIPANTS AND METHODS

Its participants were Thirty-seven student ATs (22 males, 15 females) who belong to the athletic department at K University. The participants were 14 in their 1st year, 10 in their 2nd year, 9 in their 3rd year, and 4 in their 4th year. By team type, 9 belonged to the soccer team, 9 to the regulation baseball team, 8 to the track and field team, 5 to the handball team, 3 to the rugby team, 2 to the basketball team, and 1 to the softball team. For this research, we thoroughly explained its purpose, content, and procedures to the participant student ATs, and obtained their written consent.

For database and document creation, we used FileMaker Pro 17 Advanced (Claris International Inc., CA, USA) and created a database of independent exercise for athletic rehabilitation. The student ATs were surveyed about coached exercises, and images, coaching comments, frequencies, and precautions were prepared for 88 types of exercise which were found to be coached frequently. We configured an information input screen for the main system, and used relational functions to associate it with the exercise database. On the information input screen, we enabled selection of up to four exercise types from a drop-down list.

The participant student ATs created educational documents for the athletic rehabilitation of ankle sprains, using paper media and this system. The sequence of menu creation, between paper media and this system, was randomized. The following were surveyed and the two preparation methods were compared: 1) Time taken to create the documents, 2) the difficulty of creating menus for educational coaching (from “1: Creation was difficult” to “5: Creation was easy”), and 3) the potential for ongoing provision of self-training menus (from “1: Ongoing provision is impossible” to “5: Ongoing provision is possible”).

We also allowed participants to freely record their impressions of creating educational documents using the database, as item 4). We used an online survey with Google form® to perform the questionnaire survey of items 2) to 4), so that each participant accessed the specified URL to respond to the questionnaire.

Statistical analysis was performed using BellCurve for Excel ver.3.20 (Social Survey Research Information Co., Ltd., Tokyo, Japan). For measured times, we used a Shapiro-Wilk normality test, followed by a corresponding t-test, to compare the use of paper media and this system for each measurement item by using the Wilcoxon signed rank test for each questionnaire question. We set the significance level at 5%.

RESULTS

The time taken to prepare the athletic rehabilitation menu (mean value ± standard deviation) was 7’58″ ± 4’40″ (95% confidence interval: 5′47″ to 10′08″) for creation with paper media, and 3′44″ ± 1′40″ (95% confidence interval: 2′57″ to 4′30″) for creation with this system. Preparation times for creation using the database were significantly lower than for creation using paper media. Also, the difficult of menu creation (from “1: Creation was difficult” to “5: Creation was easy”) was 3.1 ± 1.1 (median value: 3) for paper media and 4.2 ± 1.0 (median value: 5) for this system. A significant difference was observed between the groups. The potential for ongoing provision of self-training menus (from “1: Ongoing provision is impossible” to “5: Ongoing provision is possible”), was 3.2 ± 1.1 (median value: 3) for paper media and 4.3 ± 0.9 (median value: 5) for this system. A significant difference was observed between the groups (Table 1). An observed tendency of difference between documents prepared by the two methods was that, for participants in lower grades, there was relatively less difference in preparation time but there tended to be a difference in quality, while participants in higher grades prepared documents which went into more detail, but preparation time tended to be longer. In the free statements, 5 participants stated their opinion that paper media was superior. Their reasons included “I don’t know the menus in the database and the menu names don’t give me an image of the exercises”, “I’m not used to using a PC”, and “I don’t know the priority ranking for which to select”.

DISCUSSION

This research investigated whether a system that uses a database to create and deliver educational documents could be an effective tool for student ATs who support athletes. The main results were that the creation of exercise documents using the database shortened the preparation time, and that preparation was simpler and could be maintained.
Most of the opinions that student ATs expressed about operating the database to create documents were positive, such as “When I select menu items, the method, precautions, repetitions, and exercise images are displayed, so it takes less time to make documents”, and “explanations and images are displayed, not just menu items, so it’s easier to explain to players”. These comments suggest that this method is valuable for broadening the range of student ATs’ activities and making those activities more efficient. On the other hand, as the results showed, there were a few negative opinions, particularly among participants in their first year, who had only just started their AT activities. In addition to these opinions, we got the impressions that appropriate support to players required adequate functional assessment in order to decide which menu to provide, and coaching skills to give clear explanations, and that over-reliance on the system could result in decline in communication skills.

Comparing document creation with paper media and with the database, we observed different tendencies in participants of lower and higher years (Table 2). Participants in lower years (1st and 2nd year students) took relatively less preparation time but there tended to be a difference in quality. Some extreme student ATs only offered menus when using paper media, which may have been inadequate as documents. This is an example of a document prepared by a first-year participant (Fig. 1). Participants in higher years (3rd and 4th year students), on the other hand, created documents which were detailed and easy to understand, but many of them took longer to prepare documents as a result. Based on such tendencies, we want to improve the system and study education to provide with it.

This research took student ATs as its participants and limited its investigation to the supply side of rehabilitation programs. The effects of physiotherapeutic interventions on athletes through self-exercise have been widely researched. Takeda et al. have reported that after surgery for anterior cruciate ligament tears, those patients who thoroughly understood the importance and content of rehabilitation, and were motivated to do it, obtained results on a par with outpatient treatment from self-exercise alone. There have also been reports that understanding of the objectives and effects of rehabilitation raised athletes’ awareness of self-exercise. However, this research does not elucidate how awareness and results were affected among the athletes who were actually performing exercise with reference to documents in various media. Also, as this tool is still in use, it will be highly interesting to examine ongoing usage, and the effects of such usage. It also appears that the results of this research could be applicable to the potential for contribution to coaching environments which are currently restricted by the Covid-19 situation. We want to continue our investigation, with focus on these points.

This research made clear that the creation of exercise documents using the database system shortened the preparation time, and that preparation was simpler and could be maintained. Therefore, the results suggest that educational coaching for rehabilitation using a database would be valuable for student ATs.

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**Conflict of interest**

None.

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**Table 1. Comparing between paper media and database system**

|                          | Paper media         | Database system       |
|--------------------------|---------------------|-----------------------|
| Time for creation        | 7′58″ ± 4′40″* (5′47″–10′08″) | 3′44″ ± 1′40″ (2′57″–4′30″) |
| Difficulty of creating menus | 3.1 ± 1.1* (3)       | 4.2 ± 1.0 (5)         |
| Potential for ongoing provision | 3.2 ± 1.1* (3)      | 4.3 ± 0.9 (5)         |

Values are mean ± SD. *p<0.05 vs. database system. Time for creation: minute and second. Difficulty of creating menus: (from “1: Creation was difficult” to “5: Creation was easy”). Potential for ongoing provision: (from “1: Ongoing provision is impossible” to “5: Ongoing provision is possible”).

**Table 2. Different tendencies to make document creation with paper media in participants of lower and higher year students**

| Preparation time of paper media document | Quality of paper media document |
|-----------------------------------------|---------------------------------|
| Lower years students                    |                                 |
| 1st and 2nd year students, n=24         | shorter                         | higher                          |
| Higher year students                    |                                 |
| 3rd and 4th year students, n=13         | longer                          | lower                           |
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