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# SUSTAINABILITY AND REPRODUCIBILITY OF INCLUSIVE ONLINE SPORTS CLUB ACTIVITY BETWEEN UNIVERSITY JAVELIN COACHES AND AN ATHLETE WITH MILD INTELLECTUAL DISABILITY AND AUTISM SPECTRUM DISORDERS

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**Abstract.** Through a year-long case study, this study examines the sustainability and reproducibility of the "Inclusive Online Sports Club Activity (IOSCA)". It involves online coaching via ICT devices between university students specializing in physical education and special needs education and a javelin throw athlete with Mild ID and ASD who lived in a rural area. A recent policy shift in Japan is transferring school sports activities to community-based programs, particularly relevant for rural areas where coach shortages are prevalent. Online sports club activities connecting urban and rural areas are a promising solution to this issue. To address both the shortage of coaches and the need for quality instruction, this study applied the "University Student Online Coaching Model," where university students act as online coaches, supported by the "Double Coaching System," which provides mentorship and professional development for these students. The athlete's performance improved from 42.80 meters to 47.03 meters, highlighting the effectiveness of using university students as online coaches. Additionally, the study emphasizes that engaging students from teacher training and sports universities nationwide could help alleviate coach shortages. The research also demonstrated that the ICT-based setup for IOSCA reduced running costs by 93.38% and initial costs by 48%, compared to traditional methods. These results suggest that combining the "University Student Online Coaching Model," the "Double Coaching System," and a low-cost ICT environment offers a sustainable and reproducible solution for connecting urban and rural areas through IOSCA.

***Keywords*** Remote Coaching; ICT; track and field; Japan's Sports Policy; Professional Development, IOSCA.

## 1. Introduction

In Japan, sports activities for junior high, high school, and special needs students have traditionally been organized through "Club Activity" (Bukatsudou) programs, which are school-based. These activities, defined in the national curriculum guidelines, allow students to engage in voluntary sports or cultural activities under teacher supervision after school hours [1]. The purpose of these sports clubs is not only to enhance physical skills and fitness but also to cultivate important values such as teamwork, fairness, discipline, self-control, and practical thinking [2]. Club activities are currently implemented in almost all junior high and high schools across the country.

However, not all schools have teachers who are proficient in coaching specific sports. For instance, in 2014, 52.1% of junior high school teachers and 44.9% of high school teachers supervising sports activities had no experience in the sport they were responsible for [3]. This lack of expertise places additional burdens on teachers, who are often expected to provide specialized sports coaching despite their limited experience [4]. Furthermore, because club activities are conducted after school or on weekends, concerns have been raised about the extended working hours of teachers [5]. In response, Japan introduced a policy in 2022 to gradually shift school-based club activities to community-based programs by 2025 [6].

This transition aims to reduce teachers' workload by transferring club activities, particularly those at junior high schools and special needs schools, to local community organizations. By 2025, weekend club activities will be fully transitioned to local communities, with weekday activities following soon after. The Japan Sports Agency [7] hopes that this transition will create a more inclusive sports environment, where students from special needs schools and mainstream schools can participate together [8][9]. However, challenges remain, especially in rural areas, such as mountainous regions and remote islands, where a shortage of qualified coaches persists [10].

To address this issue, recent studies have explored the potential of "online sports club activities," where coaches in urban areas use ICT tools to remotely instruct students in rural areas [11]. Several case studies have been conducted to evaluate this model, such as the remote coaching of badminton and dance students on Okinawa's remote islands and the online instruction of track and field athletes with intellectual disabilities in rural areas [12][13][14]. However, the issues of coach quality, availability, sustainability, and reproducibility remain unresolved [15].

This study proposes a solution through the "University Student Online Coaching Model," where university students majoring in physical education (PE) and special needs education serve as online coaches for rural students. This model leverages the potential of university students from teacher training institutions across Japan to provide coaching through ICT devices. This study implements a year-long case study involving three university student coaches specializing in javelin throw. They will coach an athlete with intellectual disabilities (ID) and autism spectrum disorder (ASD) at a rural special needs school through an "Inclusive Online Sports Club Activity" (IOSCA). The study will evaluate the sustainability and reproducibility of this model, focusing on coach quality and cost-effectiveness.

# 2. Content

## 2.1. Research Methodology

This study explores the implementation of the "Inclusive Online Sports Club Activity" (IOSCA) using ICT equipment and the "University Student Online Coaching Model." The online coaches consisted of three university students majoring in physical education, who are also javelin throw athletes from a teacher training university in an urban area. The athlete being coached is a high school student with mild ID and ASD, living in a rural area and attending a special needs school. The detailed methodology is explained below.

***ICT Environment Setup for IOSCA***

Given that track and field events like javelin throw involve considerable movement, this study adopts the low-cost, long-term online sports club activity model proposed by Matsuyama [13]. This model integrates ICT devices with video conferencing software (Zoom by Zoom Corporation) and an AI-powered auto-tracking tripod (AAT) manufactured by Remo Tech Co., Ltd. The AAT ensures that the movements of both the coach and athlete remain within the camera frame, solving the issue of "framing out" which is common in dynamic sports (Figure 1)[※1].

To ensure seamless communication even when coaches and athletes move away from the camera, Matsuyama [13] also recommended using wireless earphones with built-in microphones.

For this study, since the coaching team consisted of two coaches per session, we utilized wireless earphones with separate left and right functionality, allowing each coach to wear one earbud for clear communication (Figure 2).

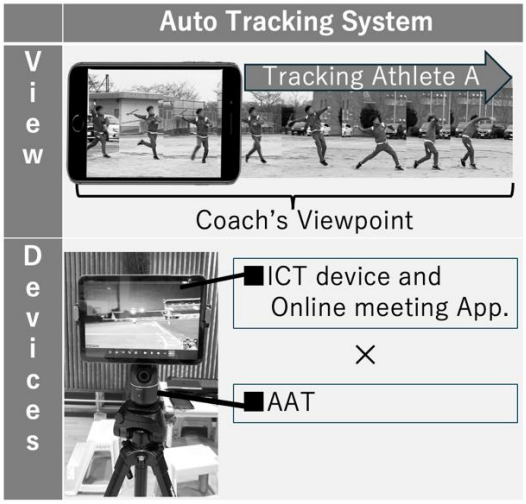


***Figure 1. ICT Environment Setup Using AAT for IOSCA***


***Figure 2. Wireless Earphone Setup for Dual-Coach Communication***

Additionally, to provide reasonable accommodations for an athlete with intellectual disabilities, this study follows the approach of using an online training log, as suggested by Matsuyama [12]. Reflecting on the training process through journaling has proven to be an effective method for mastering skills [16]. However, athletes with ID often face difficulties in documenting their experiences and insights, which hinders their skill acquisition [12][13].

To address this, Matsuyama [12] introduced a method where the athlete and coach reflect on training experiences together, summarizing key learning points through dialogue. This information is then recorded in the online log. Based on this approach, this study plans to use an online training log to assist the athlete in reviewing and organizing their training experiences.

## 2.2. Participants

### 2.2.1. IOSCA Participant: Athlete A

Athlete A is a 16-year-old male student in his second year at a special needs high school in a rural area. He has been diagnosed with mild ID and ASD by a medical institution and holds a "Ryoiku Techo B" disability certificate from his local government※2.

Regarding his sports history, athlete A attended a regular junior high school until the second grade, where he participated in the school's baseball club activity. However, due to his ID, he required academic support, and his ASD made communication with others challenging. As a result, he transferred to a special needs school in the third year of junior high school at the age of 15. Since he had an interest in throwing, developed from his baseball experience, athlete A became interested in javelin throw and began practicing it as a sport club activity upon entering high school.

After joining the high school, athlete A has participated in various competitions, including the Special Olympics for athletes with ID and regional competitions for students without disabilities, achieving notable results. However, his special needs school does not have a qualified track and field coach, and thus, athlete A lacked specialized coaching. As a result, he previously received online coaching for four months during his first year and for two months in his second year of high school from the author of this study, a specialist in coaching athletes with disabilities. athlete A has a strong competitive drive, with goals to update his personal best and rank in the top

eight in prefectural competitions against able-bodied high school students. He also aspires to continue as a javelin throw athlete in the future.

Given athlete A's background and the policy context of transferring school club activities to local communities, it was decided that athlete A would receive online coaching from university students specializing in javelin throw at a nearby athletic stadium as part of his extracurricular activities. At the time of this study, his personal best in the javelin throw was 42.80 meters.

**2.2.2. IOSCA Coaches: Coaches A, B, C, D**

Four university students (hereafter Coaches A, B, C, and D) from a teacher training university in an urban area are recruited as online coaches for this study. Coaches A, B, and C are male javelin throw athletes from the university's track and field team. Coach A is a first-year student majoring in physical education and has competed in the national high school competition (personal best: 56m69cm). Coach B is a second-year student majoring in physical education and has competed in the regional block competition (personal best: 55m13cm). Coach C is a first-year student majoring in Japanese education and placed sixth in the national high school competition (personal best: 61m71cm).

None of these coaches had prior experience in coaching athletes, nor did they have any knowledge of special needs education. To support their coaching and ensure quality instruction, Coach D, a female discus throw athlete from the same university who is studying special needs education, is included in the team to assist Coaches A, B, and C.

**2.2.3. Ensuring Coaching Quality through the "Double Coaching Framework"**

Typically, teacher training universities and physical education universities offer curricula that provide basic knowledge about physical education and sports instruction, including practical skills, based on scientific understanding. However, several previous studies have pointed out that while these curricula clarify scientific knowledge, they often lack direct practical application in coaching scenarios [17][18][19]. Similarly, Coaches A, B, and C in this study, despite their involvement in sports, lacked practical experience in consistently coaching specific athletes, particularly those with disabilities. Therefore, to ensure the quality of instruction provided by Coaches A, B, and C, as well as Coach D, a structured method of supporting their professional development was necessary.


***Figure 3. The Double Coaching Framework***

One effective approach to professional development, as identified in previous research, includes a combination of practical coaching experience and mentorship support※3. The first aspect involves gaining practical knowledge by actively coaching athletes and facing real-world

challenges in coaching [20][21] [22]. The second aspect involves the mentor providing guidance, offering coaching examples, and giving feedback on the coaches' methods, which helps facilitate professional growth. Based on these principles, this study utilized the "Double Coaching Framework" [15] to ensure the coaching quality of Coaches A, B, C, and D through a combination of mentorship and practical coaching experience with athlete A (see Figure 3).

The "Double Coaching Framework" consists of two components. The first involves Coaches A, B, C, and D learning coaching methods from an experienced mentor. The second involves Coaches A, B, C, and D applying these methods while providing online javelin coaching to athlete A.

In the first component, the following four activities were planned to support the professional development of Coaches A, B, C, and D:

- Monthly meetings are held between the mentor and the coaches to discuss and align their coaching strategies. Rather than the mentor unilaterally providing directives, these meetings encourage coaches to share their views, which helps inform and refine their coaching approach.
- The mentor regularly conducted online coaching sessions with athlete A, recording these sessions for the coaches to use as instructional examples.
- The mentor participates in real-time during online coaching sessions, answering any questions the coaches have on the spot.
- After each session, the mentor provides feedback to the coaches. If deemed necessary, the mentor also offers advice before upcoming sessions.
- In the second component, the coaches applied the advice and strategies from the mentorship sessions to their practical online coaching sessions with athlete A.

The mentor, who is the author of this study, had prior experience coaching athlete A and is also a faculty member at the teacher training university. Additionally, the mentor facilitates the use of an online training log and provides materials to aid in instruction.

### 2.2.4. Frequency of Implementation

This study plans for 45 sessions of IOSCA, conducted once a week for 2 hours. Each session involved two coaches: one main coach, selected from Coaches A, B, or C, and a supporting coach, Coach D. During the first month, the researcher also participates in the sessions to help with ICT setup and coaching techniques, with 3 or 4 coaches assisting in each session.

If athlete A is ill or if weather conditions are unsuitable in the area where the athlete trains, IOSCA is canceled. In cases where a coach is unavailable due to illness or schedule conflicts, another coach or mentor would substitute. When the mentor substitutes, the session is recorded and shared with Coaches A, B, C, and D as a professional development opportunity to learn from the mentor's coaching approach.

### 2.2.5. Administrative Functions

This study anticipates an increase in IOSCA participants and coaches in the future and, to manage this growth plans to outsource administrative functions. From this anticipation, this study uses the "Club Activity Support Service" by Kinki Nippon Tourist Co., Ltd. The service handles tasks such as coordinating the schedules of Coaches A, B, C, D, and Athlete A, setting up the video conferencing application during IOSCA sessions, and monitoring the sessions in real-time to ensure that no verbal abuse or other misconduct occurred.

### 2.2.6. Data Collection

This study collected three main types of data to evaluate the IOSCA program. First, the total number of IOSCA sessions conducted is recorded. Second, the overall costs associated with the project are tracked, including any expenses incurred for equipment, coaching, and administration. Finally, athlete A's javelin throw performance before and after the IOSCA implementation is measured. By analyzing this data, the study aims to assess the sustainability and reproducibility

of the IOSCA program, as well as determine the extent to which the coaching quality impacts athlete A's performance.

#### 2.2.7. Ethical Considerations

This study is conducted with the approval of the Tokyo Kasei Gakuin University Ethics Review Committee. Informed assent from athlete A and informed consent from the athlete's legal guardian are obtained prior to the study's commencement.

## 2.3. Research Results

### 2.3.1. IOSCA Sessions

Figure 4 shows the planned and implemented IOSCA sessions. Of the 45 sessions initially requested by athlete A, Coaches A, B, and C were available for 39 sessions (86.67%), with the remaining 6 sessions (13.33%) handled by the mentor. Out of the 39 scheduled sessions, 30 sessions (76.92%) were actually conducted. During these sessions, Coach D supported as a sub-coach in 22 of them. However, 8 sessions (20.51%) were canceled due to athlete A's health or adverse weather conditions, and one session (2.56%) required the mentor to step in due to a coach's health issue. All 6 sessions led by the mentor were completed without cancellations by athlete A.

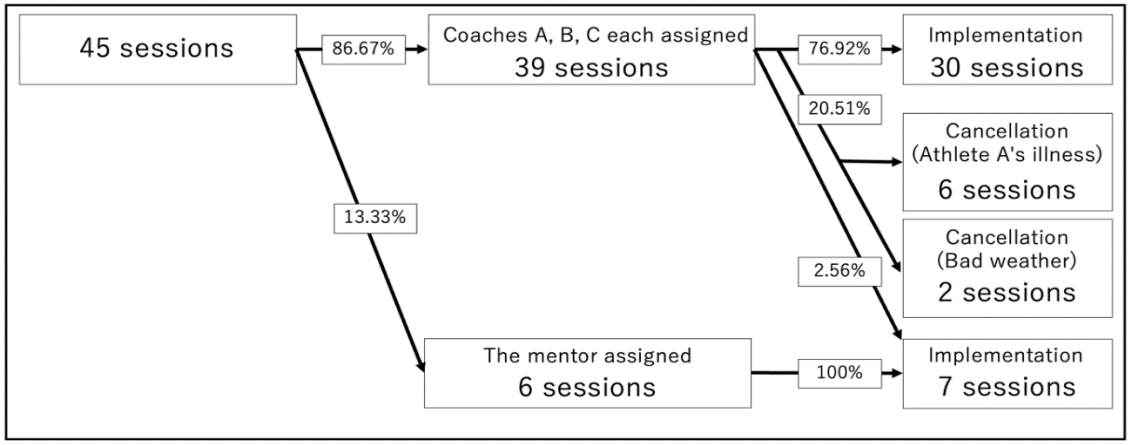


***Figure 4. Planning and Implementation of IOSCA***

### 2.3.2. Costs

#### *2.3.2.1. Running Costs*

***Table 1. Running Costs***

| Item | Content | 1year | Remarls |
|---|---|---|---|
| Persinnel expenses | Honorarium for one coaches A, B, C | ¥66,780 | ¥2226×30 sessions |
| | Honorarium for coach D | ¥48,972 | ¥2226×22 sessions |
| Communication expenses | Internet usage fee | ¥38,016 | ¥3168×12months |
| Other expenses | Outsourcing expenses | ¥66,000 | ¥5500×12months |
| Total | | ¥219,768 | |

The total running costs are shown in Table 1. In this study, Coaches A, B, C, and D were paid ¥2,226 for each two-hour online coaching session[※4]. When two coaches were involved in one session, the cost amounted to ¥4,452 per session. The total cost for the 30 completed sessions was ¥115,752. Additionally, the coaches needed internet access to use the ICT-based video conferencing system. The monthly internet cost for the coaches was ¥3,168 (tax included), with a total of ¥38,016 for the year. As athlete A used a personal smartphone contracted with a telecommunications provider, no additional costs were incurred on that end. Moreover, Kinki

Nippon Tourist Co., Ltd., which provided administrative support services for the IOSCA sessions, charged ¥5,500 per month, amounting to a total of ¥66,000 for the year.

#### *2.3.2.2. Initial Costs*

The initial preparation costs are shown in Tables 2 and 3. For the coach's side, the initial preparation costs for setting up the IOSCA environment (Table 2) included purchasing ICT equipment such as a tablet device for video conferencing applications (¥37,500), a tablet device for the online journal (¥49,800), an Auto-tracking tripod (AAT) (¥20,000), wireless earphones (¥20,000), a tripod (¥5,000), and charging accessories (¥8,000). The total came to ¥140,300. On the other hand, for athlete A, the initial preparation costs (List 3) were lower since athlete A already owned a smartphone, eliminating the need to purchase additional ICT equipment. Only an AAT (¥20,000), wireless earphones (¥20,000), and a tripod (¥5,000) were purchased. The total came to ¥45,000. Thus, the total initial costs for ICT equipment amounted to ¥165,300.

***Table 2. Initial Preparation Costs (Coach's Side)***

| Item | Content | Unit price | Quantity | Total |
|---|---|---|---|---|
| Consumables | Tablet device (for video conferencing applicati | ¥37,500 | 1 | ¥37,500 |
| | Tablet device (for online journal) | ¥49,800 | 1 | ¥49,800 |
| | AAT | ¥20,000 | 1 | ¥20,000 |
| | Tripod | ¥5,000 | 1 | ¥5,000 |
| | Wireless earphones | ¥20,000 | 1 | ¥20,000 |
| Total | | | | ¥132,300 |

***Table 3. Initial Preparation Costs (Athlete's side)***

| Item | Content | Unit price | Quantity | Total |
|---|---|---|---|---|
| Consumables | AAT | ¥20,000 | 1 | ¥20,000 |
| | Tripod | ¥5,000 | 1 | ¥5,000 |
| | Wireless earphones | ¥20,000 | 1 | ¥20,000 |
| Total | | | | ¥45,000 |

### 2.3.3. Improvement in Athlete A's Performance

Through the implementation of IOSCA, athlete A's personal best record in official competitions improved from 42.80 meters to 47.03 meters, an increase of 4.23 meters. Additionally, in practice sessions, athlete A achieved 51.95 meters. This confirms a significant improvement in performance.

It should be noted that the primary objective of this study is to examine the sustainability and cost-effectiveness of IOSCA, focusing on its durability and reproducibility. Therefore, the analysis of skill development or performance enhancement is beyond the scope of this study. Further exploration of athlete A's performance improvements and skill development in the context of online activities will be reserved for future research.

## 2.4. Discussion

### 2.4.1. Cost

#### *2.4.1.1. Running Costs of the "University Student Online Coaching Model"*

Based on the expenses incurred during this study, we have provided an estimate for the costs required to conduct four sessions per month for a year (52 weeks) in Table 4.

***Table 4. Estimate of Running Costs***

| Item | Content | 2hour per session | 1 month(4 sessions) | 1year(52sessions) |
|---|---|---|---|---|
| Persinnel expenses | Honorarium for one coaches A, B, C | ¥2,226 | ¥8,904 | ¥115,752 |
| | Honorarium for coach D | ¥2,226 | ¥8,904 | ¥115,752 |
| Communication | Internet usage fee | ¥792 | ¥3,168 | ¥38,016 |
| Other expenses | Outsourcing expenses | ¥1,375 | ¥5,500 | ¥66,000 |
| Total | | ¥6,619 | ¥26,476 | ¥335,520 |

In this study, we considered the athlete's disability and conducted the online club activities with a two-coach system, consisting of a main coach and a sub-coach. The estimated cost for each session with this two-coach system was ¥4,452 per session, resulting in ¥17,808 for four sessions per month, and a total of ¥231,504 annually for coaching fees.

If a single-coach system is used for athletes without disabilities, the cost is halved: ¥2,226 per session, ¥9,904 for four sessions per month, and ¥115,752 annually. Including coaching fees, internet usage fees, and outsourcing expenses, the estimated cost per session is ¥6,619, amounting to ¥ 26,476 for four sessions per month and ¥335,520 for 52 sessions per year, as shown in List 4. Compared to previous case studies where over ¥100,000 was required per session, this study's model reduced running costs by 93.38%.

However, the cost-effectiveness of IOSCA should also consider the number of athletes and the results achieved. This model is scalable, allowing multiple athletes to participate in the sessions. For instance, if three athletes participated in IOSCA, the cost per athlete would be divided, resulting in ¥2,206 per session, ¥8,825 per month, and ¥111,840 annually. However, as no studies have yet examined the "University Student Online Coaching Model" with multiple athletes, further research is necessary.

Additionally, internet usage fees and outsourcing costs may vary based on the specific circumstances. For example, this study incurred internet usage fees because the outdoor training facility lacked a network connection. If wireless internet access had been available at the facility, those fees would have been unnecessary. Regarding outsourcing, this study handled the administrative tasks for one athlete and four coaches, which was manageable for the mentor (the author). However, if the number of participants were to significantly increase, it would become more challenging for a single individual to manage. Hence, outsourcing these tasks was considered a future necessity. Some previous studies have explored outsourcing administrative duties, but the specific costs and operational details remain unclear. Further examination of administrative functions is needed to ensure sustainable IOSCA operations.

#### *2.4.1.2. Costs Associated with Establishing the IOSCA Environment*

The initial setup cost for the ICT equipment used in this study totaled ¥165,300, as shown in Lists 2 and 3. In a previous study, Murachi et al. (2023) conducted research using a high-performance AI camera with a monthly subscription fee of ¥20,000, amounting to an annual cost of ¥240,000. In comparison, the total ICT equipment costs in this study were reduced by 43.19%, saving ¥74,700. Furthermore, since the equipment used in this study does not require a subscription, the cost for the second year would be ¥0, resulting in an annual savings of ¥240,000. Thus, the cost of setting up the environment was achieved at a much lower price compared to previous cases.

The ICT equipment and wireless earphones used in this study were relatively high-end. However, it is possible to reduce these initial costs further by using more affordable ICT devices and wireless earphones that can still effectively support video conferencing systems. Therefore, a lower-cost setup could also adequately support IOSCA activities.

### 2.4.2. Quality of Coaching and Improvement of Athlete A's Performance

This study aimed to ensure the quality of coaching through the "Double Coaching System," which focused on the professional development of Coaches A, B, C, and D. As a result of IOSCA, athlete A improved their official competition record from 42.80 meters to 47.03 meters, a 4.23-meter increase. During practice, athlete A even achieved a throw of 51.95 meters, an 8.15-meter improvement. In comparison, the Japanese record for male javelin throwers with intellectual disabilities (F20 class) stands at 55.70 meters, meaning athlete A's practice record was only 3.75 meters short of the national record. Moreover, athlete A threw 46.73 meters at a national competition for F20 athletes, placing second in Japan. These results suggest that Coaches A, B, C, and D provided high-quality coaching that enabled athlete A to perform at a high level.

Additionally, examining the learning experiences of Coaches A, B, C, and D would provide valuable insights into the effectiveness of the "Double Coaching System." It would also be worth exploring how mentorship influenced both athlete A's performance and the professional development of the coaches. However, a detailed examination of these aspects is beyond the scope of this study and will be reserved for future research.

### 2.4.3. Management of IOSCA: Coach Scheduling and Backup Plans

In this study, athlete A initially requested 45 sessions, but Coaches A, B, and C could commit to 39 sessions. The remaining six sessions were handled by the mentor (author). The main reason Coaches A, B, and C were unable to attend all six sessions was due to their own participation in competitions as active athletes, which overlapped with IOSCA sessions, particularly as competitions were generally held on weekends. Additionally, the fact that IOSCA sessions were held on Friday evenings, right before the weekend competitions, also affected their availability.

Moreover, the IOSCA system must account for other potential disruptions, such as periods when coaches are involved in teacher training programs or face unexpected injuries. For example, Coach B was unavailable for approximately two months due to preparations for and participation in a teacher training program, and Coaches C and D were unavailable for about three months due to injuries. Of the 39 scheduled sessions, one session was substituted by the mentor due to a coach's illness.

Therefore, to sustain the "University Student Online Coaching Model," it is crucial to incorporate the coaches' competition schedules into the work shifts and prepare a robust backup system to address periods of teacher training, injuries, or health issues. This backup system should include multiple coaches across different years and allow flexibility in coach assignments to maintain sustainability.

### 2.4.4. Potential of IOSCA

While beyond the scope of this study, it is desirable to clarify the following three potential outcomes regarding the effectiveness of IOSCA in the future.

First, Coaches A, B, C, and D may have gained a deeper understanding of disabilities through their interactions with Athlete A via online coaching. Second, by successfully guiding Athlete A to improve their javelin throw record, Coaches A, B, C, and D may have experienced increased self-esteem as coaches. Similarly, athlete A's interactions with the coaches and their progress in setting new records may have positively impacted athlete A's self-esteem as well. Finally, all of the coaches (A, B, C, and D) who participated in this study improved their own personal bests in javelin and discus throwing, with Coach A improving from 56.69 meters to 60.79 meters in javelin, Coach B from 55.13 meters to 56.35 meters, Coach C from 61.71 meters to 71.13 meters, and Coach D improving their discus throw from 32.22 meters to 36.77 meters, suggesting that certain elements of IOSCA may have contributed to the enhancement of their athletic performance.

However, since these considerations are outside the scope of this study, these implications will remain as suggestions, and a more in-depth exploration of these possibilities will be left for future research.

## 3. Conclusions

This study implemented and examined the sustainability and reproducibility of IOSCA between urban and rural areas using the "University Student Online Coaching Model" and an ICT-based environment over the span of one year. The key findings are summarized as follows:

***Cost:***

Previous studies involving renowned coaches or athletes and high-end communication systems indicated running costs of over ¥100,000 per session [15]. In contrast, the running cost

for the "University Student Online Coaching Model" in this study was ¥6,619 per session, resulting in a 93.38% cost reduction. In terms of initial setup, this study built the IOSCA environment for ¥165,300, which reduced costs by 45.19% compared to prior research that required annual subscriptions of ¥240,000 for AI cameras. Thus, combining the "University Student Online Coaching Model" with the ICT-based environment demonstrated higher sustainability in terms of cost compared to traditional approaches.

***Reproducibility, Sustainability, and Quality of Instruction in the "University Student Online Coaching Model":***

This model involves university students majoring in physical education or special needs education from teacher training or sports universities across Japan. Given the abundance of such students nationwide, this model is highly reproducible.

However, since many of these students have limited experience providing specialized coaching to individual athletes, additional support is necessary to ensure instructional quality. In this study, the "Double Coaching System" was used, where a university faculty member mentored the student coaches to promote their professional development. This support led to athlete A improving their official javelin throw record from 42.80 meters to 51.95 meters, demonstrating that high-quality coaching was provided through IOSCA. The study suggests that the "Double Coaching System" can effectively guarantee the quality of instruction in the "University Student Online Coaching Model."

Moreover, to ensure the continuity of IOSCA, careful planning of university student coaches' work schedules is essential, considering the timing of teaching practicums, athletic events, conditioning periods, and unexpected illnesses or injuries. Therefore, the study recommends building a backup system involving multiple students across various grade levels to maintain sustainability.

***Limitations of this Study:***

Finally, this case study focused on four coaches and one athlete, so the results may not be directly applicable to larger groups. Future studies should include multiple athletes to further validate the findings. Nevertheless, this research provides a foundation for expanding the possibilities of IOSCA in rural areas.

***Note:***

- ※1 Previous studies have reported cases where fixed-point cameras were used for weight training instruction and cases where remotely controlled cameras were used for volleyball coaching [23][24]. In track and field events, however, there is a high possibility that athletes might move outside the camera frame, preventing coaches from receiving the necessary visual information. Even in the case of remotely controlled cameras, their movement speed is slower than the athlete's, leading to the same issue of "frame out," which renders these methods ineffective for this study.
- ※2 In the athlete's region, the assessment and issuance are conducted based on a four-level criterion, with a B assessment representing the lightest level.
- ※3 In previous research, the main source of professional development has been observing the coaching methods of experienced coaches [25][26][27]. Additionally, to enhance the effectiveness of professional development, it has been shown that observers must not only watch experienced coaches but also interpret why those methods were used and how athletes' awareness or performance was consciously changed as a result [28][29].
- ※4 The remuneration for coaching was set according to the minimum wage regulations of the prefecture where University A is located.

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