The Changes of Rowing Skill through Physical Education Class

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Keywords: rowing, physical education, biomechanics, novice rower, learning process

Abstract

The purpose of this study was to define a concrete way of teaching materials for novice rowers in the regular curriculum of physical education at school and to describe the learning process of rowing skill for them. 200 participants into this study had no previous experience of rowing. This project was held for 2 years at the school curriculum. At first year we tried to implement the rowing instruction for novice rowers. Moreover, at second year, we tried to encourage students to acquire a rowing skill efficiently using an improved plan arranged the original teaching plan. We were able to identify the way of teaching materials for novice rowers through 2 years project. The results of which students performed in this study, including the rate (strokes per minute), and the uniformity skill, were clearly suggested the acquisition of their rowing skill and positive improvement of them for a number of students through physical education class. There was a significant correlation between the uniformity skill and the rate, therefore the detail of rowing instruction for novice rowers has become showed that they are supposed to row on a low rate when they learn it at early stage. As these results of this program, we were able to define the rowing instruction and to describe how they learn rowing skill. This program could be used as a guidance of rowing in order to teach rowing for beginners in various situations, for example in physical education class, outdoor experience and the like.

Introduction

The number of people practicing rowing sports in Japan is clearly very low compared with Western countries, which have reached the height of its popularity, and ordinary people hardly acknowledge an interest in rowing sports. In fact, they have almost no chance at all to participate in rowing in real life. In order to increase its basic popularity and invigorate an interest in rowing sports, it is important to organize more rowing activities and encourage people to participate in them, which would promote better interests.

By introducing rowing lessons in a physical education class, students will be able to come in contact with the natural environment, and through this experience it is hoped that they would develop sensitivity to nature. Furthermore, by experiencing mutual communications with colleagues or associates, they could foster their social skills, which we believe might enable them to see things in life with a broader view.

In the crew events which row with a number of rowers, it is thought that the most important technical element is the uniformity of crew, which

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how well rowers can synchronize timing of movement of their oars each other (Wing AM & Woodburn C, 1995; A Baudouin & D Hawkins, 2004). The highly uniformity skills also could make up for the total low power of rower in the crew. In case of teaching for novice rowers, due to enhancement of uniformity skills, they may be able to feel the sensation of propulsive force of boat. Therefore, we considered that this sensation would affect their interests in rowing.

The purpose of this study was to find a concrete way of teaching materials for novice rowers through the regular curriculum of physical education at school and to describe the learning process of rowing skill for them in order to obtain the basic data to instruct it efficiently.

Methods

This rowing project was held for 2 years at the school curriculum. At first year we tried to define the rowing teaching materials for novice rowers. Moreover, at second year, we tried to encourage students to acquire a rowing skill efficiently using an improved plan arranged the original teaching material which were implemented in the previous year.

Participants

200 participants into this study, who were students from Ishikawa National College of Technology, had no previous experience of rowing. The rowing lessons were held in regular physical education classes in May each year, 2008 and 2009.

Protocol

The contents of this program were teaching of rowing form on the Rowing ergometers, and rowing boats for 20 minutes. Students divided into 5 groups (about 40 students in a group). This program was held at physical education classes based on a school curriculum. Four students and one instructor got aboard rower seats (stern, 3rd, 2nd, bow) and cox seat on each boat, respectively. It was not specified that anyone takes any rower seats. The instructors engaged in giving students basic instruction (how to use oar, how to move their body and so on). This program implemented 3 times/group (1 time per week).

Parameters

The learning process of uniformity skill was estimated from the analysis of video image which was taken while participants were rowing boats. Parameters for estimating of the uniformity skills are:

1. Rate (strokes/minute).
2. time lag at CATCH-phase (ms)
3. time lag at FINISH-phase (ms)

Time lag at CATCH-phase is the temporal difference between stern rower (who seated on the stern of the boat) and other rowers when the blades are placed into the water, in other words which is loss of timing-synchronization with each rower. Time lag at FINISH-phase is the temporal difference between stern rower and other rowers when the blades are lifted up from the water surface completely. RATE is the number of strokes per minute by a crew.

Equipment

In this research, Recreation boat, Macon blades (traditional U-shaped oar blade) and rowing ergometer (Concept2 Type D) used to instruct for participants. A recreation boat is with 4 rowers and cox, which makes it easier to learn basic rowing technique and less likely they will fall in water. Also, the filming while they were rowing boats was used Digital video camera (Sony, 30Hz).

Data Analysis

The Freadman tests were used to analyze the changes in the mean of time lag, which are reported as mean ± S.D. Spearman correlation coefficients were used to determine the strength of relationship between the parameters. The significance level was set at $p<0.05$ for all statistics.

Results and Discussion

It was only 8 crews (32 students group) that could finish 3 sessions in this 2009 program because physical education classes were missed due to bad weather, therefore many students were not be able to attend all classes and excluded from this study for comparing of rowing skill among sessions.

Changes of each parameter

The stroke rate is the number of strokes divided by one minute of time. A one-minute period divided by the number of strokes will give the time per stroke (Soper and Hume, 2004). The mean rates (±SD) in 2008 and 2009 were the 1st session: 15.3(±3.4), 2nd: 20.4(±5.5), 3rd: 28.3(±3.1) and 1st session: 20.0(±4.3), 2nd: 23.0(±6.1), 3rd: 23.5(±3.7), respectively, which are showed in Figure 1.

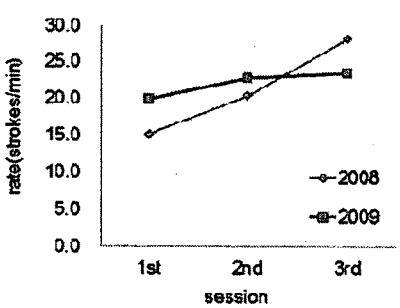

Figure1. The mean rate on each swssion in 2008 and 2009

The mean rate in 2008 was gradually increased along with the number of lessons the students took. When rowing a recreation boat, if all four rowers cannot keep strokes following a word or a verbal signal of which a cox is calling out for the sake of synchronization of a crew or driving forward of a boat, it will not move forward as quick. That is to say, it could be considered that the rate was increased gradually because all rowers became better at moving their body quickly and rowing in unison, and they consequently moved the boat smoothly forward. The mean rate in the third session was 28.2, and all of the rowers could row at a high rate in this time. Several previous studies showed that stroke rate is significantly correlated to average boat velocity with correlation coefficients reported from r=0.66 (Martin TP and Bernfield YS, 1980) to r=0.76 (McBride ME, 1998). Rowing performance is determined by average boat velocity. Therefore increasing stroke rate indicated positive effects to student's rowing performance.

However this result might not have showed that their rowing technique, especially rowing form and uniformity skill, improved comparing of third session with first session. We therefore determined that we tried to teach skills to novice rowers on the situation of rowing low rate in 2009 project (you can see Figure 1).

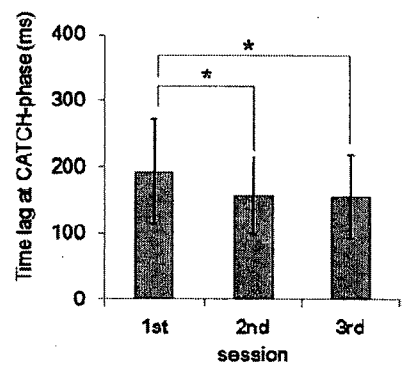

Figure2. The mean of time lag at CATCH-phase(ms) for each session

The results of the mean in time lag at CATCH-phase have been calculated (Figure 2). The means ± S.D. of it were resulted in 193.6± 79.2 ms

(session1), 157.1± 58.0 ms (session2) and 155.8± 62.8 ms (session3), respectively.

Time lag at CATCH-phase in session 2 and 3 was lower than in session 1, which is considered that students were able to synchronize with each rower who was in same boat. However, this did not result in gradual reduction of the time lag. Furthermore, it is considered that there was a wide range of lea skills for novice rowers because the standard deviation was large for each session. As a result, the magnitude of standard deviation was not only affected by the improvement of uniformity skills but also by the learning of accurate rowing form.

Additionally, the result of relationship between time lag at CATCH-phase and Rate was calculated (Figure 3). There was a significant correlation between time lag at CATCH-phase and Rate ($t=0.74$, $p<0.05$). Therefore, it was suggested that it was effective for novice rower to set a low Rate when they learned to rowing uniformity skill.

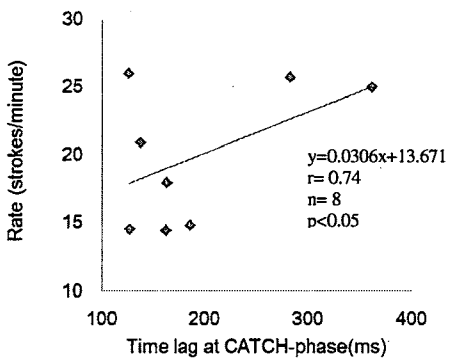

Figure3. Correlation between the mean of time lag at CATCH-phase(ms)and Rate (strokes/minute)

In terms of FINISH-phase, there was no significant change of the time lag and no significant correlation with other parameters.

Assessment of the project

Due to the various conditions of the water surface, which is effected by the velocity and the direction of the wind, a person in charge of a class needed to check the speed of current and the wave height in advance on the day of implementation and decided whether a rowing session could be carried out. Over 7m/s of wind speed was considered as unsuitable for rowing and between 4 to 6m/s rowing should be practiced with caution.

Recreation boat, which was used in this study, was far safer than others, but we could not be overconfident in term of safety of students since they had no experience in rowing and no control over a boat by themselves. Therefore, it was very important to make a proper judgment on the condition of the water surface. During the rowing sessions, we did not experienced any sudden weather changes, such as lightening or thick fog, and could complete the study safely without any accidental incidents, even though we relied only on the judgment made on the water conditions. However, rowing is a sport which is practiced in a natural environment and unpredictable accidents or mishaps could occur at any time, so we always need to make a proper judgment regarding safety and risk with a cautious attitude. In fact, there were two accidents involving loss of life in the past, which rowers, who were belong to Kanazawa University Rowing Team, died during the trainings (Kanazawa Univ. IWOKAI, 2010). Eleven people died by the accident happened on April 6, 1941 in Biwako Lake, Shiga Prefecture (Yukio Yokoi, 1983), and one student died on March 25, 1967 in Kahoku Lagoon, Ishikawa Pref. where we held this project. A stone bearing his name has placed in front of boat house of Kanazawa Univ.

The rowing classes were conducted in a regular curriculum of a physical education class at Ishikawa National college of Technology. The academic motto of the college as stated; to gain basic knowledge in order to live a better life as a human being, to cultivate multilateral views to

accommodate themselves in an international society, to promote and maintain personal health, to acquire social skills with broader views and to develop a positive and practical attitude to solve the problems of life that lie ahead. In the annual academic program, rowing was chosen as a new sport to be introduced to the students, because it was relatively unfamiliar and would present a challenge that could be overcome as a group.

In the rowing class we could teach a large number of students approximately 40 at one time. It was a very satisfying result for me that we could complete the rowing class successfully while having no safety problems or accidents during the course of this study. Although only three sessions were provided in each class, it became clear that how and what level of skills they could acquire during lessons and what kind of changes in their attitude toward rowing lessons could be expected. Moreover, we learned what kind of instruction details and methods are necessary to conduct a rowing lesson effectively for beginners. The instruction program, which we developed based on the information collected during this study, would be useful as a guideline for teaching novice rowers.

Teaching materials for novice rowers

We briefly described the teaching material for novice rowers as follows:

◆ Establishing a teaching environment by

1. using recreation boat
2. putting one instructor in a cox seat to teach and steer a boat
3. deciding a safety guideline clearly on each environment

◆ What you are supposed to teach to novice rowers is

1. How to get on a boat
   -should careful at very first lesson especially
2. How to row
   (Basic rowing techniques on a boat)
3. How to move the body
   -should check the body movement on ergometer before getting on a boat and then teach same movement as you did on ergometer
4. How to use an oar
   -should keep the oar to be vertical to water surface all the time
5. How to synchronize
   -should give rowers the verbal signal and make them pay attention at catch phase

Conclusion

The aim of this study was to find a concrete way of teaching materials for novice rowers through the regular curriculum of physical education at school and to describe the learning process of rowing skill for them in order to obtain the basic data to instruct it efficiently. As these results of this program, it could identify the learning process of uniformity skill for the novice rowers. It is important for novice rower to set the low rate and to pay attention to CATCH-phase in order to enhance the uniformity skills. We will need to research the learning process of rowing skills in the longer term in the future. After this study, it became clear to us to understand how novice rowers acquire rowing skills and consequently we could establish teaching material for inexperienced people in this sport. In order to popularize rowing as a sport among Japanese people, this program could be used as an effective guidance tool in various situations.

Acknowledgement

The current project was a part of Ministry of Education, Culture, Sports, Science and Technology; No. 1114, 'Gendai GP'. The authors would like to thank the coaching stuffs and students

of Ishikawa National Collage of Technology for their participation in this project. Without their enthusiastic assistance, this project would not have been completed.

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