

Learning Fast in Bicycle Riding using Chest Girdle for Kindergarten Students

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Abstract—This research introduced the chest girdle tool to increase the ability learning of kindergarten students age of 4-5 years old in bicycle riding. The effectiveness of a bicycle riding training program for improving knowledge, safe cycling behavior, and attitudes is evaluated with two groups of students: one with chest girdle and one without using chest girdle. The chest girdle has shown effectively improvement and increase the ability of student in bicycle riding.

Index Terms—Bicycle Riding, Kindergarten student, Chest girdle.

I. INTRODUCTION

A recent study noted that limited exercise in kindergarten student is associated with poorer performance on standardized test scores [1]. Healthy eating and exercise not only directly affect an individual's long term health but also may pass on positive benefits to future generations.

Physical development includes student's gross and fine motor skills. Physical development is sometimes taken for granted in the early childhood classroom because it is often assumed that it happens automatically. Not only is this assumption untrue, but teachers need to remember that physical development is just as important to learning as every other area of development.

Therefore, we introduced the bicycle riding for our kindergarten students at early age of 4 and 5 years old under the circumstance of "A good start is an early start". Whereas other kindergarten students from other schools are ready to ride a bicycle by the time they are 6 years old. Here are the benefits of bicycle riding [10]:

- Developing strength, balance, and overall fitness
- Burning up calories
- Strengthening the heart, lungs, and lower-body muscles and bones
- Developing and strengthening the muscles surrounding the knees without impact

The physical factors that determine the age for learning to ride a bicycle are balance, rotational speed of the bike's wheels and propulsion. A student's ability to learn how to ride a bicycle depends on his/her physical development,

coordination, and mastery of gross motor skills and fine motor skills. Most student are able to ride with training wheels by age 4 and riding on two wheels by age 5. There's no set age for taking off on two wheels, but usually by 4 or 5 years of age children have enough balance and coordination. Most 6-year-old kindergarten students are physically able to ride a bicycle without training wheels and have developed a sense of how to avoid dangers and injuries. They also probably has the coordination required to use hand brakes. [1, 2]

In all stages of bike riding, a student needs to achieve motor planning to not only get on and off the bike, but also to master pedaling and steering. Core stability, balance and vision are all required to maintain an upright position on the bike, especially when movement is introduced. Bilateral coordination is utilized for integrating movement from both sides of the body for both pedaling and steering.

For a student to begin to ride a two wheel bicycle they must first have developed the foundation skills necessary, which include muscle tone, balance, stability, bilateral coordination, motor planning, and body awareness. Without all of these skills, bicycle riding may be very difficult and scary for a student. Our research goal is to help and support student to ride a bike with balance and no training wheels with fun and confident.

II. METHODOLOGY

Our purposed training program is geared to help students learn to ride bicycle faster than the traditional ways [3], but our first goal is to make sure the bike is safe and properly fitted. In our training, the training wheels is no need to be used. Two hours of playground instruction are provided during the training, which takes place during the afternoon. Safety instructions are administered by trained and certified professionals.

The program comprises structured lesson plans that help students develop gross and fine motor skills, dynamic and static balance, spatial awareness, bilateral co-ordination along with the necessary skills to an ordinary pedal bike in a safe, challenging but fun way. The training program includes 3 main procedures as follows:

A. *Helmet/clothing and Bicycle check*

Before starting the training, each bikes are checked for proper working brakes, tire pressure, oiled gears and potential safety hazards. Helmets are checked for proper size, strap adjustment and placement on the student's head. The seat is adjusted height so the students can straddle the bike

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and have his feet flat on the ground.

Correct saddle height for a student bike depends on the age of the student and type of bike. When just learning to ride, it's important for a student to be able to sit on the saddle with both feet on the ground, so they can push themselves along and learn to balance. As their skills improve, and they begin pedaling on their own, their saddle are raised for more efficient pedaling. Common saddle heights for student bikes are described below.

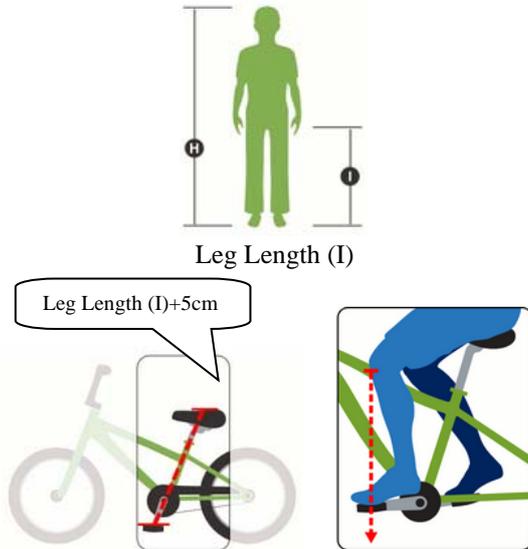


Fig. 1. Adjustment of Saddle Height using leg length [7]

TABLE I: CHILDREN BIKES [6]

Students Height (cm)	Bike Wheel Size & Age
85-100	12 inches / Ages 2-4
85-100	14 inches / Ages 3-5
95-110	16 inches / Ages 5-7
110-120	20 inches / Ages 7-9

B. Warm up stretching body

To get ready for the riding training, the warm up stretching body is required as illustrated in Fig. 2.

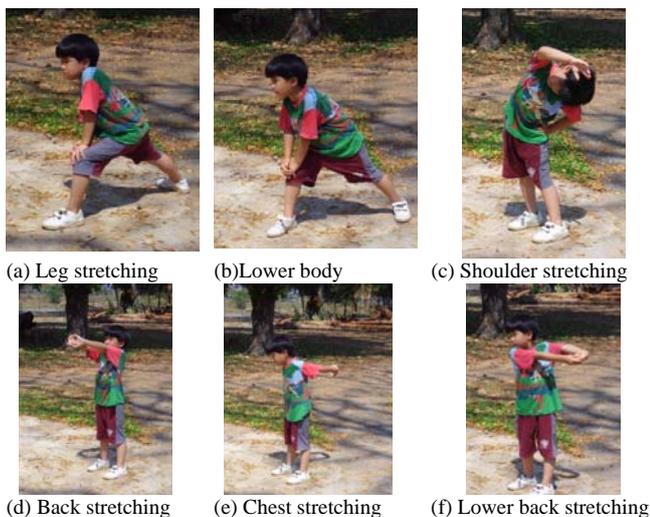


Fig. 2. Warm up Stretching

C. Bicycle handling skills

Composes of 4 modules. To ride a bike, a student needs to develop good core stability and balance, visual and bilateral

coordination skills and overall strength and endurance. Therefore, each modules takes around 15 minutes to complete, therefore, the program runs for around 60 minutes.

- (1) Stopping and starting
- (2) Straight line riding
- (3) Shoulder checking, and
- (4) Signaling

In module 1, students were trained on basic weight shifting while the student's feet are on the ground, on the pedals and then pedaling with appropriate weight shifting as shown in Fig. 3 (b). The first step is to train the student to weight shift and turn the bike in the direction of the weight shift.



(a) weight shifting (b) weight shifting on saddle

Fig. 3. Weight Shifting

Once the student had scooting and could go a good distance without putting down a foot. Then refitting a pedal on the student's leading leg – usually the right – and continuing with the scooting. The pedal means the student has a prompt of where to put their foot. It also means they can also scoot for longer distances as their confidence grows.

Teaching to ride independently on a bike needs to occur backwards. First the student must feel secure on the bike, especially when he is moving, so it is necessary teach him to stop.



(d) step 4 (e) step 5 (f) step 6

Fig. 4. Magnetization as a function of applied field.

In this research, we proposed the chest girdle using cloth

wrapping around student in order to support the trainer to guide the student position as shown in Fig.4.

This supporting tool was introduced in order to help the trainer walk along with his student while trying to pedal without stooping his back. This tool could support a student by holding their back or shoulder and allow the trainer walking alongside them as they start pedaling. Comparing with traditional way whilst the trainer has to stoop himself to the height of student and use his hand to support the student pedaling, this proposed technique could decrease the tiredness of back fatigue from stooping and could last longer time for trainer to support his student.

While pushing the bike forward, have the student put both feet out to the ground to stop the bike, otherwise they panic and jump off, throwing the bike down and getting hurt. Once they feel secure in putting both feet out and staying upright, have them begin to push back on the pedals then put one or both feet out for stability.

After mastering stopping it is time to go on to riding forward, combining pedaling and balance. Each student was instructed to ride their bicycle along a 30 meter chalk line, stop at the stop sign, and turn left around a pillar. The children were asked to imagine that they were riding along a main road.

At each module, the students were also taught about pertinent traffic regulations and appropriate safe cycling behaviors. These 4 bicycle handling skills were emphasised because studies had suggested that weaving on the road, swerving into traffic without looking, not signaling, and cycling through stop signs are risk factors for serious injury[4, 8]. For example, at the straight line riding station, the student were taught that a bicycle had the same right to the road as a car and that weaving on the road was a risky behavior.

III. RESULTS

Bicycle handling skills were assessed on a school playground with 2 groups of students, one using the chest girdle and one without using the chest girdle. Both groups were assessed with 3 components of safe bicycle riding behavior. A total of 100 kindergarten students were enrolled in the training program.

The study students in Table 2 were between 4 and 5 years of age and were from Kindergarten Demonstration School, Khon Kaen University, Thailand.

TABLE II: SAFE BICYCLE RIDING BEHAVIOR RESULTS

Students	Average Time (min)	Average Score of 3 modules
Group 1: Age 4-5	60.4	100%
Group 2: Age 4-5	105.7	100%

The primary outcome measure was 3 components of safe bicycle riding behavior [9]: (a) straight line riding, (b) coming to a complete stop, and (c) shoulder checking before a left turn as illustrate in Fig.5.

These 3 behaviors scored yes or no were operationalized a priori. Bicycle riding behaviors were assessed by an independent observer who had no interaction with the children. Straight line riding required the student to remain

within 10 cm of either side of the chalk line for the entire 30 meters. A complete stop required the student to slow down to a halt at the line and put at least one foot on the ground. Shoulder checking required the student to take his/her eyes off the road ahead and turn his/her head to look over the left shoulder.



Fig. 5. Safe bicycle riding test

At follow-up, there were no impacts on riding in a straight line, coming to a complete stop, and shoulder checking before making a left turn. There were also no impacts on any of the knowledge or attitude measures between the two groups.

The results showed that the first group with chest girdle spent approximately 1 hour riding bicycle with confident and could complete the basic requirements from 3 module tests whereas the group 2 spent more times to be able to ride the bicycle.

In addition, students who had confident in bicycle riding immediately start playing on their own bicycles. They rode their own bicycle quickly, brake, stand up on the pedals, and perhaps try to lift the front wheel off the ground, riding without their hands on the handlebars or with their feet on the handlebars. This is how children slowly become one with their bicycles – and that is the first step to becoming safe and confident bicycle riders.

IV. CONCLUSION

When first learning to ride, a young kindergarten student is not able to work on the development of balance, coordination and endurance at the same time. Therefore, the chest girdle has shown the positive effect helping student learning fast and increase the skill of bicycle riding of students comparing with the one without using it. It helps the student develops a feel for balancing. Once they feel fairly secure with balancing, the support can be slowly decreased.

After the student becomes proficient in riding and stopping then he/she will begin to learn to balance himself for starting from a stationary position. Most students do learn the program in one day, and continue practicing at home with their parents. Bicycling benefits the student's development in many ways.

It contains a lot of the elements that help develop the student both physically, motorically, psychologically, cognitively also entails a lot of social activity, and last but not least, it creates joy and helps build up the student's self-esteem.

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