MOOC 2
Child-Centred Coaching & Physical Literacy

Chapter 4:
Motor Skill Development and Conditioning for Children

MOOC 2: Child-Centred Coaching & Physical Literacy

Study Guide

An Intellectual Output of iCoachKids:

Innovative Education & Training for a Specialist Children & Youth Coaching Workforce

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iCoachKids MOOC 2 Study Guide

Introduction

"A coach's primary mission is to help sport participants develop not only as athletes, but also as people. To fulfil that aim, a coach needs functional and task-related competences that are underpinned by knowledge and reflection."

From the European Sports Coach Framework (p. 39)

Congratulations Coach, by engaging in the iCoachKids MOOC 2, you have demonstrated that you have an open mind to learning more about coaching children and to further developing your own coaching skills.

Improving your coaching takes time and effort. Coach development should proceed in a progressive and sustainable way. Such an approach takes into consideration your stage of development as a coach, how you learn and which participants the coach is working with.

How Coaches Learn

In this MOOC, we recognise that learning is a lifelong process and that multiple experiences can facilitate the development of your coaching ability. During your progress through MOOC 2 we have included a variety of learning experiences to meet the needs of coaches and how they learn.

A coach is not a blank slate. Whether through personal experiences as participant or spectator, you arrive to coaching with your own conception of what it is and how it should happen. The following task will allow you to consider what you are bringing to your coaching.

STUDY GUIDE TASK: What Are You Bringing to Your Coaching?

(There are no right or wrong replies. This exercise is about you taking stock of your previous experiences.)

Coaches Learn Best When…	Your Learning and How you Like to Learn
List Your Sports Experience	**What Does This Bring to Your Coaching?**
Your Education	**What Does This Bring to Your Coaching?**
Life Experience/Learning	**What Does This Bring to Your Coaching?**
Other Things You Think/Feel Reflect You	**What Does This Bring to Your Coaching?**

Your Learning

In the early stages of coach development, you may benefit strongly from learning opportunities provided through formal education – in MOOC 2 this is reflected in what you read and the personal tasks that you undertake in applying this knowledge into your coaching. This can be seen as laying a knowledge foundation. These activities challenge or confirm initial personal theories and support the creation of a child-centred framework that helps coaches organise and make sense of their coaching practice.

As you continue to develop as a coach, non-formal learning opportunities become more relevant. Your interaction with the children,

other coaches, parents, mentors and open source material provides a chance to check and challenge your emerging philosophy and way of doing things as well as gaining new knowledge. In MOOC 2 this is reflected in activities and tasks you do with others and in your environment.

It is important to note that much of coaches' learning takes place on the job. As a coach, your self-awareness and your ability to reflect on your experiences are essential to this.

STUDY GUIDE TASK: How Coaches Learn Best and How You Like to Learn

The column on the left is what research says about how coaches learn best. The column on the right is for you to: reflect on these statements; identify whether they may apply to YOU; and if they mean anything for YOUR LEARNING. This will develop you SELF-AWARENESS of how you like to learn:

Coaches Learn Best When…	Your Learning and How you Like to Learn
• Their prior experiences and abilities are recognised and they are encouraged to reflect and build on them	
• They are motivated to take responsibility for learning and are given opportunities to drive it and direct it to their own needs	
• The application of what is being learned to the practical context in which they coach is clear and facilitated	
• The topics and learning materials are clearly relevant	
• The climate is positive and supportive to minimise anxiety, encourage experimentation and challenge them appropriately	
• Interaction and sharing with other coaches is promoted	
• A variety of learning activities is offered	
• They experience some success and gain feedback that builds their self-confidence	

If you have completed these two STUDY GUIDE TASKS, you will have started to engage in the learning process promoted in the iCoachKids MOOCs. You will have identified what you are bringing to coaching children; and how you learn.

Well done and read on to learn more about how the MOOC 2 Study Guide is laid out to assist you in your learning, how the content can be applied into you coaching and to your growth as a CHILD-CENTRED COACH of children.

MOOC 2 Study Guide Structure

In MOOC 2, your development as a coach is promoted using a blended learning package composed of various activities to foster learning (for example, reality-based activities, problem-based learning, practical-coaching opportunities and reflection in/on action). This will promote knowledge gains and behavioural change and encourage you to seek additional self-directed learning opportunities.

The following HEADINGS and icons will signify different activities you will undertake in the MOOC 2 Study Guide:

VIEW – This is the video track linked to the Chapter and Section of the Study Guide you are considering

READ – This is the content knowledge that is outlined in the video track. It gives you the opportunity to examine the content at your own pace and/or to review in writing what is verbally outlined in the video

STUDY GUIDE TASK – This is an activity that will get you to consider how the content you have viewed/read may apply during your coaching with the children that you coach, and reflect on how you may change your coaching behaviours

PERSONAL COACHING TASK: This is an activity that will get you to apply the content into your coaching, with the children you coach, and to reflect on how it went for the children and for you. You may need to do these tasks a number of times and reflect on them to be able to fully apply the content into your coaching, in line with your coaching philosophy and to the benefit of the children

COACHING WITH OTHERS – This is an activity that will get you to engage other coaches you work with to discuss, apply, try, observe, get feedback from and reflect on how they see/feel your coaching is developing, and how the content can be applied by you and the other coaches. It may also encourage you to engage other relevant people, like parents, referees, club officials and even the children you coach!

COACHING IN YOUR ENVIRONMENT – This is an activity that will get you to consider how child-centred is the approach of your

club/school/community group. You will then consider/discuss what changes may be made to become a more child-centred coach.

QUIZ – At the end of each chapter there will be a quiz for you to complete. This will give you a chance to re-enforce your learning by getting you to re-visit some of the main ideas covered in the chapter and hoe they can apply to your coaching. Approach the questions in an 'open-book' format, which allows you to re-read the sections of the study guide before you write your answer.

CHAPTER CLOSING TASKS – Each chapter will end with some tasks that will get you to consider/apply the ideas and coaching tools covered in the chapter into your coaching. The tasks may include:

PERSONAL COACHING TASKS

COACHING WITH OTHERS

COACHING IN YOUR ENVIRONMENT

FURTHER VIEWING/READING – By its nature, only a certain amount of content is included in the MOOC. If you want to learn more about a topic, this will direct you to additional materials to view or read

Your Development Journey as a Children's Coach

Working with children can be a very worthwhile and positive experience for people. With the growing knowledge and the approach put forward in the iCoachKids MOOCs, this experience can be positive for each and every child, as well as for each and every coach.

It's over to you now to take the responsibility to grow your coaching knowledge and ability. Enjoy the journey coach!

iCoachKids: MOOC 2 Study Guide - Learner Activity Tracker: Chapter No 4

Name: _____ **Date:** _____

As you complete each of the activities in each of the sections, please put a tick ✓ in the circle. This will allow you to track what you have completed and where you can restart when you return to the Study Guide after a break.

Study Guide Activity / Chapter Section	VIEW / READ	PRE-CHAPTER / STUDY GUIDE TASK	PERSONAL COACHING TASK	COACHING WITH OTHERS	COACHING IN YOUR ENVIRONMENT	QUIZ	CHAPTER CLOSING TASKS	FURTHER VIEW / READ
Introduction	○							
Section 4.1	○							
Section 4.2	○		○	○				
Section 4.3	○		○	○				
Section 4.4	○		○	○				
Summary / Conclusion	○					○	○ ○	○

If you have completed each of the activities in each section and the Learner Activity Grid is complete. WELL DONE! You can move to MOOC 3.

Chapter 4, Introduction

VIEW AND/OR READ

You can view this section on the online MOOC https://www.youtube.com/watch?v=vGprLHqZRGI&t= or you can read it in the Study Guide. If it re-enforces your learning, you can do both.

Introduction

Thanks for joining us in Chapter 4 of the iCoachKids MOOC 2. Hopefully you have learnt loads so far.

Chapter 4 focusses on **Motor Skill Development and Conditioning for Kids**.

This is an important topic and a vital part of developing a physically literate child. Coaches often ask questions like:

- Is conditioning safe for kids?
- How do we improve the motor skills of our children?
- Can kids do strength training?

There are a lot of myths and misconceptions on this topic area and we hope to debunk them to help your coaching and improve the motor skills and conditioning of the children you coach.

This chapter will identify some important aspects of motor skill development and conditioning for kids, propose ways in which you can implement this within your coaching and provide you with some great activities to start applying in your sessions.

Specifically, after completing this chapter, you will be able to:

1. Understand the importance of ‘Fundamental Movement Skills’ and ‘Foundational Movement Skills’ and encourage the development of these within your kids.
2. Deliver Physical Conditioning and Athletic Movement Skills Competencies with the kids you coach.
3. Incorporate the development of the Energy Systems within your coaching sessions
4. Understand the importance of Strength and Healthy child development.

That’s it! Quite a menu isn’t it?

There is some great information on developing the motor skills and physical conditioning of your kids. This information will help you deliver appropriate and safe sessions to help young people be happy and healthy and maintain a love for sport and physical activity for life.

Chapter 4, Section 4, Part 1

Developing Safe and Efficient Movers Part 1

VIEW AND/OR READ

You can view this section on the online MOOC: https://www.youtube.com/watch?v=w0G8d4rhq-U&t= or you can read it in the Study Guide. If it re-enforces your learning, you can do both.

Introduction

Welcome to Section 4.1 on Motor Skill Development and Conditioning for Kids.

As we saw earlier, one of the key components of Physical Literacy is the competence to engage with physical activity and sport. These next few sections are all about describing what being a competent mover is all about. We will also show you how to incorporate these into your sessions.

The title of this section is Developing Safe and Efficient Movers. In a nutshell, being SAFE is about ensuring that movement happens in a way that minimises the chances of injury. Conditioning the body to safely take the force generated during the movement and ensuring that the movement is conducted in a technically appropriate way are key.

Safe = Less chance of injury = Conditioning + Appropriate Technique

On the other hand, **Moving Efficiently** is all about generating the maximum amount of force with the minimum amount of energy.

Efficient = Maximum Force with Minimum Energy

Fundamental Movement Skills and Foundational Movement Skills

In this part, we are going to introduce you to the concepts of **Fundamental Movement Skills** and **Foundational Movement Skills**. We will then give you some tips on applying these skills within your coaching.

Motor Skill Development, otherwise known as **Motor Competence**, is the degree to which an individual can perform human movement. In other words, one's ability to move appropriately to fulfil a broad range of functions.

Motor Competence = Capacity to Perform Human Movement

Motor Competence has been associated with lots of POSITIVE health benefits for kids and as adults. These include:

1. Increased Physical Activity Levels
2. Health related fitness indicators such as body composition and cardiovascular fitness
3. Perceived competence
4. Healthy Weight Status

Therefore, the development of Motor Competence is ***VITAL*** for both long-term health and sporting performance!

In more recent times, the focus within coaching children has been on developing **Fundamental Movement Skills**.

Fundamental Movement Skills

Fundamental Movement Skills are the building blocks for more advanced movement and include:

1. **Locomotor Skills:** including activities like running and hopping.
2. **Object Control:** including activities like catching, kicking and striking.
3. **Stability:** including activities like balancing and twisting.

In his classic work, David Gallahue suggested that children ***CAN*** master most of the Fundamental Movement Skills by 6 years of age. All children, however, ***SHOULD*** have mastered ***ALL*** of the Fundamental Movement Skills by 10-11 years of age!

All children should have mastered all of the Fundamental Movement Skills by 10-11 years of age!

However, Fundamental Movement Skill development does not appear naturally – it needs to be ***DEVELOPED*** through ***PRACTICE***!

CAUTION – RED ALERT!

Research in countries around the world including the United Kingdom, Ireland, Australia and the United States has shown that children's competence of Fundamental Movement Skills is *LOW*! This leads to problems of low physical activity, poor fitness and increased levels of overweight and obese children – and therefore restrictions in lifelong physical activity!

Children's Fundamental Movement Skills are lower than in previous generations

Foundational Movement Skills

Although Fundamental Movement Skills have been a key focus in recent years – Canadian researcher **Ryan Hulteen** recently proposed the idea of Foundational Movement Skills.

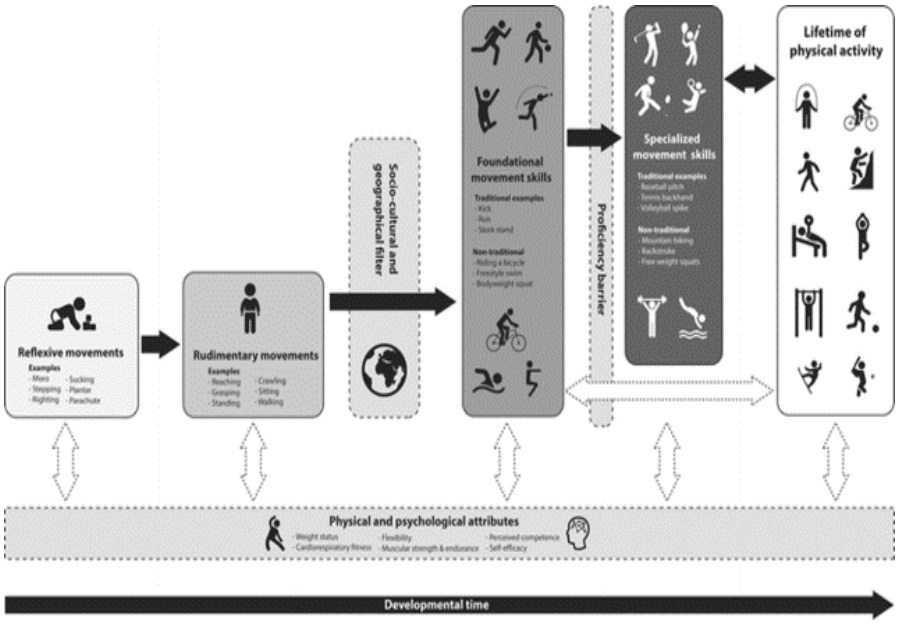


Figure 1. Hulteen, R. et al., (2018) Development of Foundational Movement Skills: A Conceptual Model for Physical Activity Across the Lifespan, Sports Med, 48, 1533-1540

Foundational Movement Skills reflect a broader range of movements that a child (or adult) can perform in a range of settings, for instance: land, water and in the air. Foundational Movement Skills broaden the classification of movement skills important to become physically competent.

These Foundational Movement Skills include the Locomotor, Object Control and Stability skills seen before, but also skills not previously identified as Fundamental.

These include activities related to cycling, swimming and resistance training – YES – Resistance training for children.

Some examples of Foundational Movement Skills not included in traditional Fundamental Movement Skills classifications include:

- Cycling
- Freestyle swimming stroke
- Lunge
- Overhead Press
- Push-Up
- Rolling a ball
- Scootering
- Sliding
- Squat
- Treading Water

That is a good list, right?

In addition, Hulteen also identified how these Foundational Movement Skills may then transfer to specialised movements.

For example, traditional fundamental movement skills like a kick transfer to a sport specialised movement of a football / rugby kick. Whilst non-traditional activities like a body weight squat transfer to strength and resistance training.

These skills are vital for continued physical activity participation across the lifespan in multiple environments.

Coaching Implications

So, what does all this information mean for YOU and YOUR PARTICIPANTS!
Here are our top tips…

1. **Plan and deliver** Fundamental Movement Skills in the coaching sessions of your children. These can include Stability, Object Control and Locomotion.
2. Please visit our **YouTube Channel** for lots of examples of activities you can do.
3. **Aim to plan and deliver non-traditional strength type** Foundational Movement Skills in your coaching sessions. Please watch these videos from the iCK Conference for practical examples.

- **Video 1**
- **Video 2**

4. Please note that the videos are over 1-hour long.
5. **Encourage your participants and their parents** to develop a range of Foundational Movement Skills. Taking part in activities like cycling, scootering and swimming will really help
6. **Encourage your participants to diversify** and participate in a range of activities.

Following these steps will help children develop **Foundational Movement Skills** necessary for a lifetime of physical activity and ensure a healthy, fit and active life!

Let us move onto Section 4.2 **Developing Safe and Efficient Movers Part 2.**

Chapter 4, Section 4, Part 2

Developing Safe and Efficient Movers Part 2

VIEW AND/OR READ

You can view this section on the online MOOC: https://www.youtube.com/watch?v=nj7V0EEUw8A&t= or you can read it in the Study Guide. If it re-enforces your learning, you can do both.

Introduction

We hope you enjoyed Part 1 of **Developing Safe and Efficient Movers**. In that section, we introduced the importance of **Fundamental Movement Skills** and **Foundational Movement Skills** and some coaching strategies for developing them with your kids.

Typically, when looking at the basic elements of Fundamental and Foundational Movement Skills, existing models have referred to what is known as the **Fundamentals of Movement** or ABCs:

- Agility
- Balance
- Coordination
- Speed

Traditional Fundamentals of Movement = Agility + Balance + Coordination + Speed

Physical Conditioning and Athletic Motor Skills Competencies

While this classification is useful, in this section we want to take this to the next level of detail and introduce you to **Physical Conditioning and Athletic Motor Skills Competencies** for children. These include a few more elements that we believe add a little bit more depth to the picture.

To do this, we are going to review two existing models and bring them together into a third model developed to help coaches integrate this into their coaching.

Youth Physical Development Model

First up, the Youth Physical Development Model for boys and girls developed in 2012 by Rhodri Lloyd and Jon Oliver.

Their model suggested that there are a number of skills and capacities that **CAN** and **SHOULD** all be **TRAINED** and **DEVELOPED** with children. These are:

- Fundamental Movement Skills
- Sport Specific Skills
- Mobility
- Agility
- Speed
- Power
- Strength

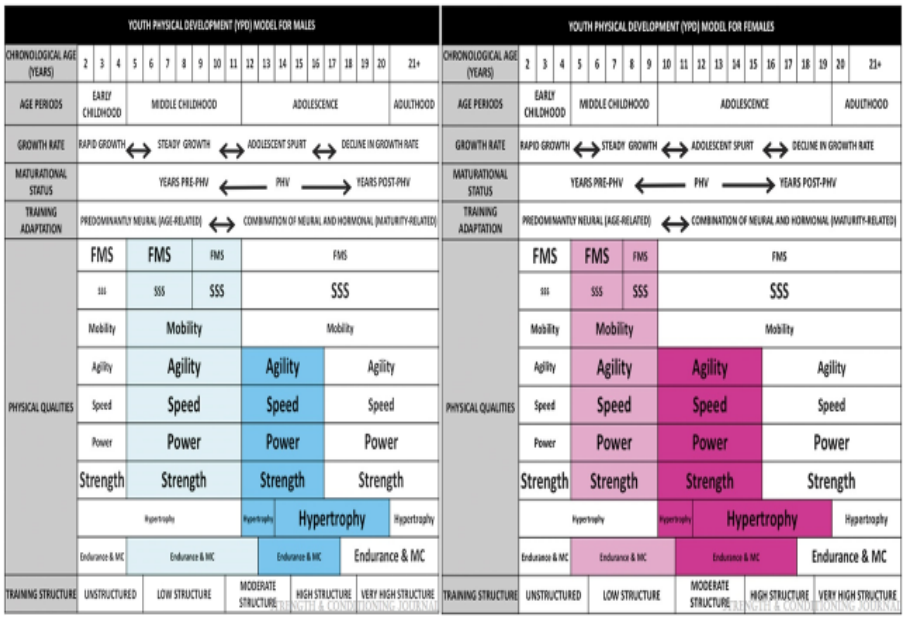


Figure 3. The Youth Physical Development Model - Reproduced from Lloyd & Oliver (2012) - Strength & Conditioning Journal

This Youth Physical Development Model has been vital in emphasising the importance of physical development for children and that training

such attributes is safe and effective! We will speak about this model a bit more in Section 4 of this chapter.

Having understood the Lloyd and Oliver model, considering how coaches can implement this physical conditioning within their sessions becomes very important.

Athletic Movement Skill Competencies

To do this, we are going to use the eight athletic motor skill competencies proposed by Jeremy Moody (2012) and Rhodri Lloyd et al (2015). These include:

1. Lower Body Bilateral Movements (for instance, a Squat)
2. Lower Body Unilateral Movements (for example, a Lunge)
3. Vertical & Horizontal Upper Body Pushing (as in a push up)
4. Vertical & Horizontal Upper Body Pulling (like a pull up)
5. Anti-rotation and Core Bracing (for instance a plank)
6. Jumping, Landing and Rebounding Mechanics (an example would be a Vertical Jump)
7. Throwing, Catching and Grasping, (like catching and throwing a tennis ball) and
8. Acceleration, Deceleration and Reacceleration (for example speed and agility activities like chasing games)

These **Athletic Motor Skills Competencies** provide a solid base for the development of the fundamental and foundational movement skills introduced in the previous section. They can also be applied across the

types of physical conditioning identified by Lloyd and Oliver in their model.

Athletic Motor Skill Competencies
= Base for Fundamental and Foundational Movement Skills

Areas of emphasis to work on with children

Ok, so after these two great models, time to bring it all together. We have tried to make this simple for coaches and come up with 8 areas of emphasis we can work on with children, including:

Areas of Emphasis to Work on with Children	
1. **Locomotor Skills** like • Running • Skipping • Bounding • Jumping • Hopping	2. **Multi-directional Movements** like • Lateral • Backwards • Diagonal • A Combinations of these
3. **Lower Body Stability and Strength** like • Squatting • Lunging • Single Leg Squat • Hip Hinging • Landing on one and two legs	4. **Upper Body Stability and Strength** as in • Horizontal and Vertical Pushing • Horizontal and Vertical Pulling • Throwing
5. **Trunk Stability and Strength** including • Front • Side • Back • Rotations	6. **Joint Mobility** including • Ankle • Knee • Hip • Thoracic mobility activities
7. **Changing Speed** including • Acceleration • Deceleration • Re-acceleration • Maximum Speed exercises	8. **Agility and Changing Direction** as in • Cutting • Turning • Evading • Dodging • Reacting activities

Phew! That's quite a menu isn't it? There are lots of movement and physical conditioning activities that you can include in your coaching sessions.

You may be thinking though – how do I do this in my sessions?

RAMPAGE Session Structure

We suggest following the **RAMPAGE** session structure for maximising physical development within your coaching sessions. We have developed the **RAMPAGE** acronym in our work with Leeds Rhinos Rugby League club.

RAMPAGE session structure

R	RAISE	Locomotor Skills & Multidirectional Movement
A	ACTIVATE	Lower Body, Upper Body, and Trunk Stability and Strength
M	MOBILISE	Mobility – Ankle, Knee, Hip, Thoracic
P	POTENTIATE	Speed, Agility and Change of Direction
A	ACTIVITY	Physical, technical, tactical or psychosocial drills
G	GAMES	Incorporate activity into games scenarios
E	EVALUATE	Evaluate your session

A **RAMPAGE** session stands for

R for Raising – the body temperature by focusing on locomotor and multidirectional movement. You can also throw in some object control skills here

A for ACTIVATE & M is for MOBILISE – the key muscles and joints. This is a good opportunity to work on lower body, upper body and trunk stability and strength alongside mobility

P for POTENTIATE – This means increasing the intensity of the activity and can focus on changing speed, agility and change of direction

A for ACTIVITY – This can be the main focus activity of your session and can include any physical, technical, tactical or psycho-social component

G for GAMES – That is, incorporating the above activity into a Game based scenario and

E for EVALUATE – Always remember to evaluate your session so you know what worked and what did not!

Conclusion

So, there you go. A range of information to incorporate physical conditioning within your coaching with children and to support the development of movement competence and physical literacy. The aim is for this to lead to the development of movement skills, improved fitness and a healthy lifestyle within your children.

Good luck and see you in the next section!

Personal Coaching / Coaching with Others

a) Using the template below, design a session where you will work with your kids on the 8 Areas of Emphasis to Work on with Children proposed in the section.

b) You (and the other coaches you coach with) design a session where you will work with your kids on the 8 Areas of Emphasis to Work on with Children proposed in the section.

Club:	**Age Group:**	**Date:**
Duration:	**No. of Children:**	**Equipment:**
Session Aim:		
Warm Up Activities:		**Areas of Emphasis:**
Main Activities:		**Areas of Emphasis:**
Cool-Down Activities:		**Areas of Emphasis:**
Session Evaluation:		
Evaluation – Areas of Emphasis:		

Chapter 4, Section 4, Part 3

Building the Engine Part 1 – Understanding Energy Systems

VIEW AND/OR READ

You can view this section on the online MOOC: https://www.youtube.com/watch?v=1fU0kdFsxZA&t= or you can read it in the Study Guide. If it re-enforces your learning, you can do both.

Introduction

The previous sections discussed 'quality of movement' – how we coach children to move safely and effectively. This section discusses how the body works to supply energy to power these movements.

This is important, because to help children become capable of performing movements with more intensity, or for longer periods of time, we need to think about how to develop their energy systems.

We, humans, require energy to power our movements. The energy we use comes from the food we eat, and is stored in various forms inside our bodies. When it is time to use our stored energy, it needs to be quickly converted into a usable form, a high-energy molecule known as ATP or Adenosine Triphosphate.

Three energy systems transform energy stores into ATP

Now, how the body produces ATP depends on the type of activity we engage in.

We can categorise movement activities by intensity and duration. This is a bit of a trade-off. The higher the intensity of the activity, the shorter the duration we can maintain it for.

High Intensity = Low Duration

Low Intensity = High Duration

The three main categories of activity are Explosive Efforts, High-Intensity Efforts, and Endurance Efforts. Each different type of effort is primarily supported by a different metabolic pathway.

3 Types of Activity

- Explosive Efforts
- High-Intensity Efforts
- Endurance Efforts

Put simply, a metabolic pathway is the chain of chemical reactions that lead to the creation and use of ATP.

Metabolic Pathway = Chain of Chemical Reactions

We will explain these pathways a little more now.

1. Explosive Efforts - Phosphagen System

The first activity type we will deal with is **Explosive Efforts**. These are all-out efforts where children run as fast as they can, throw as far as the can, or jump as high as they can.

Children will often naturally engage in these types of activities. The energy system that supplies these types of activities is known as the Phosphagen System. Energy from this energy system is instantly available – which is important if you need to avoid danger – but is also depleted very quickly, usually within a few seconds. For this reason, explosive activities cannot be maintained for very long.

Phosphagen System = Instant Availability but Quick Depletion

2. High-Intensity Efforts - Glycolytic System

The next activity type is **High-Intensity Efforts**. These are sustained efforts where participants work as hard as possible for durations of up to a minute.

Examples of this type of activity include tug-of-war, long sprint races like 200m and 400m, and short swimming races. The energy system that supplies these types of activities is known as the Glycolytic System. This system is relatively inefficient and generates a number of waste products that need to be removed from the working muscles. As a result, these types of activities often feel uncomfortable and can result in burning muscles. In free-play settings, children don't typically engage in these types of efforts. They are more likely to alternate between explosive efforts and much lower intensity recovery bouts.

Glycolytic System = Relatively Inefficient + Waste Products

3. Endurance Efforts - Oxidative System

The final activity type is **Endurance Efforts**. The energy system that supports these efforts is known as the Oxidative Energy System. It is called this because it relies on oxygen to break down energy stores to supply ATP. This is why we breathe harder when we exercise as we are supplying oxygen to our working muscles. This energy system is a little slow to respond when activity starts, but once activated it is extremely efficient and can supply energy for very long periods of time. This is the predominant energy system whenever activities last for longer than a minute in duration – which is most of the time!

Oxidative System = Slow Activation + High Efficiency

All Three Energy Systems Work Together

It is important to note that all three energy systems work together to supply energy for activities. All of the energy systems are active at all times but make bigger or smaller contributions to the energy supply based on the activity being performed. This is why children can still sprint or jump even after hours of playing!

Improving the Energy Systems Fitness

Now that we know what the energy systems are, it is time to give some thought to how we should train children to improve these energy systems. This is what most coaches might refer to as Fitness. In short, the more well developed your energy systems are, the more exercise you can do.

When aiming to train the energy systems, the mode of training should align with the energy system you want to develop. If you want to develop the ability to perform explosive efforts, training should involve very

intense efforts that last a few seconds in duration and lots of rest in between. To develop the endurance system, work intervals should be a few minutes in duration.

A number of methods have been shown to be effective in developing energy system capabilities in children. These include:

1. **Long Steady Distance Training**: Long steady distance or LSD training - this is about doing continuous exercise bouts lasting up to 20 minutes.

2. **Endurance Intervals**: Endurance intervals which entail work bouts lasting from 90 seconds to 4 minutes, with similar rest periods.

3. **High Intensity Intervals**: High-intensity intervals which comprise of 10-30 second work bouts with rest periods that are at least twice as long as the work bout.

4. **Sprint/Agility**: Repeat sprint of agility activities, that is up to 5 second work bouts with long recovery periods between bouts.

5. **Games-Based Activities**: Game based training like small-sided games for total durations of 20 minutes of more. If you like, this duration can be accumulated using different game types.

Implications for Training Children

All of these methods have been shown by research to be effective for developing energy systems in children. Despite this, there are a few things we need to keep in mind when training children:

1. Training to exhaustion should be avoided: Children also have smaller energy stores than adults, and as a result fatigue faster, and training volumes must reflect this. In order to avoid this, please allow children to self-select training intensity, and rest period durations where possible.

2. Variety in training: Children need to develop a range of neuromuscular abilities for sport, and repeating the same type of activity in high volumes increases the risk of overuse injury. For this reason, we recommend that a variety of different conditioning activities should be used.

3. Games-based fitness development works: Game based activities offer a holistic solution where sport specific technical and tactical skills can be improved at the same time as energy systems. These activities are naturally enjoyable and provide children the opportunity to self-regulate their exercise intensity. These should be a key part of any youth training programme.

Personal Coaching / Coaching with Others

a) Write out in the template below and review one of your previous coaching sessions and work out which energy system was being trained the most in each of the activities that were included.

b) Using the template below plan a training session with you fellow coaches, identifying which energy systems are being used.

Club:	**Age Group:**	**Date:**
Duration:	**No. of Children:**	**Equipment:**
Session Aim:		
Warm Up Activities:		**Energy System Used:**
Main Activities:		**Energy System Used:**
Cool-Down Activities:		**Energy System Used:**
Session Evaluation:		
Evaluation – Energy Systems:		

Chapter 4, Section 4, Part 4

Building the Engine Part 2 – Developing Strength

VIEW AND/OR READ

You can view this section on the online MOOC https://www.youtube.com/watch?v=8MEUTEOySrc&t= or you can read it in the Study Guide. If it re-enforces your learning, you can do both.

Introduction

The previous section looked at the different energy systems and when and how they can be developed. This section will look at the implications of how children grow and develop on what we can do to promote **Strength Development**.

Yes, you read it right; we will explore the topic of Strength Development in children and debunk a few myths along the way.

While the potential physical and psychosocial advantages of youth sports participation are well known, there are still some misconceptions about the importance of strength development in children.

Research has shown a decline in motor skill performance and physical strength across Europe in the last 10 years.

Children's motor skills and strength have got worse in the last 10 years

Therefore, it is important that coaches understand how **Strength Development** can be incorporated into training practices for children.

What is Strength?

Scientifically, Muscle Strength is defined as **'the maximum force, torque or moment developed by a muscle or group of muscles during one maximal voluntary contraction or action'.**

Put simply – Strength = the Ability to Exert Force

Misconceptions and Myths!

Previously there have been some misconceptions about strength development in children, which may have led to coaches avoiding this type of training. However, there is now a large amount of research and evidence to support the benefits on strength development in children. Importantly, the benefits of correctly prescribed resistance training programmes with competent supervision and correct coaching of exercise technique have been shown to outweigh any potential risk *(Faigenbaum et al., 2009).*

Benefits of Strength Training with kids outweigh any potential risks

Ok, so let us have a look at some of the **MYTHS ABOUT STRENGTH DEVELOPMENT IN CHILDREN.** These include beliefs like:

1. Resistance training will stunt children's growth
2. Youth resistance training is unsafe
3. Children cannot increase strength
4. Resistance training is only for young performance athletes
5. Weightlifting is inappropriate for young children

Let us explore why these statements are wrong.

First, let us see WHY it is IMPORTANT TO DEVELOP STRENGTH IN CHILDREN?

The development of strength in children is important not just for performance benefits but also improved health. These include:

- A Lower Cardiovascular Risk Profile
- Better Weight Control and/or Body Composition
- Greater Bone Health
- Enhanced Psychological Health and Well Being
- Improved Motor Skills Performance (jumping, throwing, catching)
- Increases other physical qualities such as speed and agility
- Injury Reduction

HOW STRENGTH DEVELOPS IN CHILDREN

Well, that is a good list isn't it. Let's focus now on HOW STRENGTH DEVELOPS IN CHILDREN.

Strength gains occur throughout childhood and adolescence due to growth and maturation. Pre-adolescence, that is before puberty, strength development is due to neural factors rather than hypertrophic factors.

What does this mean? It means that because young children do not have adequate testosterone levels to stimulate increases in muscle mass, strength increases are due to neural adaptations like:

1. ***Increased motor unit activation*** which means more motor units are recruited and there is an increase in contractile strength within the muscle.
2. ***Positive changes in motor unit co-ordination, recruitment and firing*** which means an improved ability of the muscles, joints and nerves to work together more efficiently.

Up until puberty, strength development in boys and girls is very similar and it increases with age due to the mentioned neural factors. During puberty boys experience a greater development in strength due to an increase in testosterone levels which leads to increases in muscle mass and strength.

In girls, less dramatic increases in muscle hypertrophy are observed during puberty. Such increases are typically due to factors other than testosterone like growth hormone and insulin-like growth factors.

So, the key question is HOW DO WE DEVELOP STRENGTH IN YOUNG CHILDREN?

Due to both the health and performance benefits, it is important to include strength development as part of a training programme for children at all stages of development as highlighted in section 4.2 of this MOOC and the **Youth Physical Development Model** developed by Lloyd and Oliver.

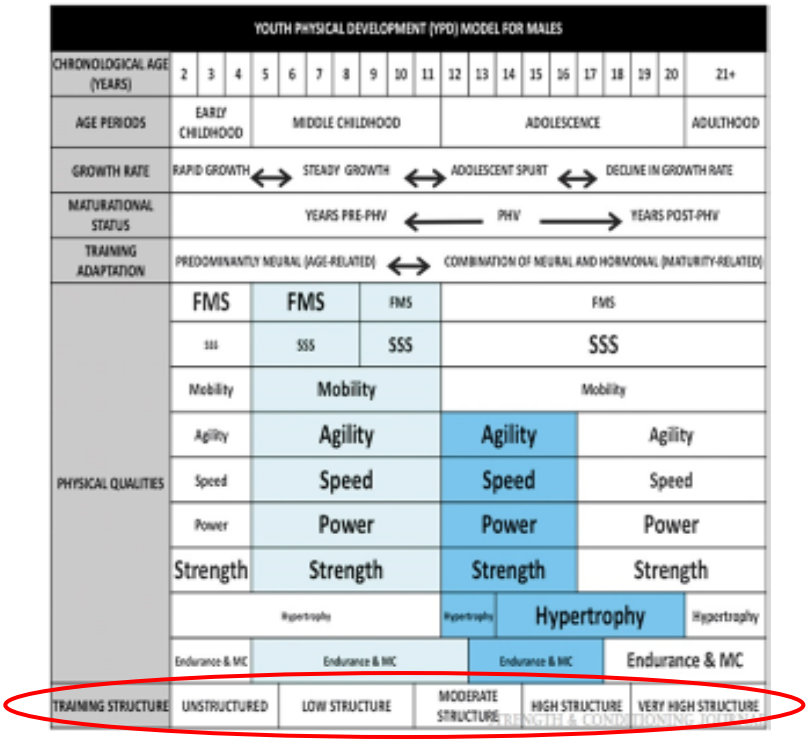


Figure 4. The Physical Youth Development Model (Lloyd & Oliver, 2012)

YOUTH PHYSICAL DEVELOPMENT (YPD) MODEL FOR FEMALES																				
CHRONOLOGICAL AGE (YEARS)	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21+
AGE PERIODS	EARLY CHILDHOOD			MIDDLE CHILDHOOD					ADOLESCENCE										ADULTHOOD	
GROWTH RATE	RAPID GROWTH ↔ STEADY GROWTH ↔ ADOLESCENT SPURT ↔ DECLINE IN GROWTH RATE																			
MATURATIONAL STATUS	YEARS PRE-PHV ← PHV → YEARS POST-PHV																			
TRAINING ADAPTATION	PREDOMINANTLY NEURAL (AGE-RELATED) ↔ COMBINATION OF NEURAL AND HORMONAL (MATURITY-RELATED)																			
PHYSICAL QUALITIES	FMS			FMS				FMS	FMS											
	SSS			SSS				SSS	SSS											
	Mobility			Mobility					Mobility											
	Agility			Agility					Agility							Agility				
	Speed			Speed					Speed							Speed				
	Power			Power					Power							Power				
	Strength			Strength					Strength							Strength				
	Hypertrophy								Hypertrophy				Hypertrophy						Hypertrophy	
	Endurance & MC			Endurance & MC					Endurance & MC							Endurance & MC				
TRAINING STRUCTURE	UNSTRUCTURED			LOW STRUCTURE					MODERATE STRUCTURE				HIGH STRUCTURE						VERY HIGH STRUCTURE	

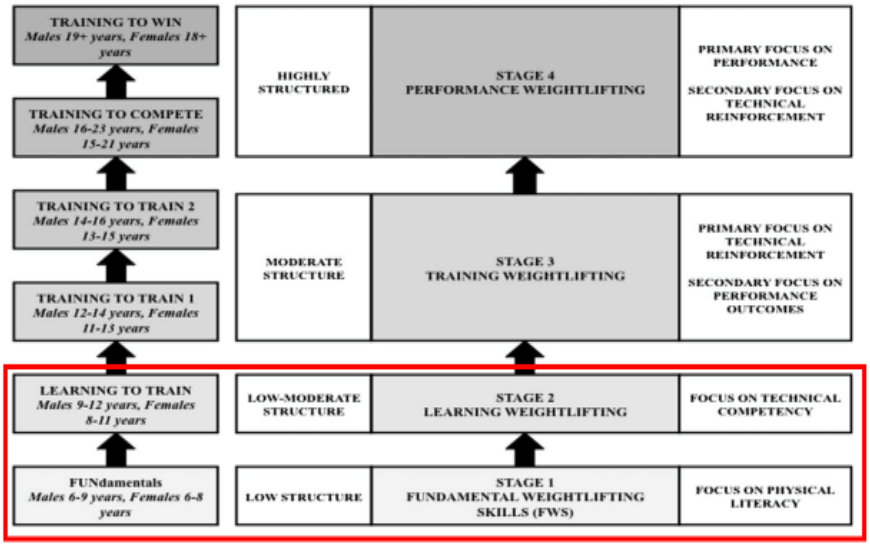
However, it is important to know that strength can improve beyond normal growth and maturation depending upon the intensity, volume and duration of training.

Importantly, strength development sessions should not simply be viewed as an addition to kids training regimes, but as a replacement for other forms of training (i.e. endurance or skill) to avoid overload and injury. Research has indicated that 2–3 sessions per week on non-consecutive days is most appropriate to develop strength in children.

Manage Workload = 2-3 times a week max

SO, HOW DO WE GO ABOUT DEVELOPING STRENGTH IN CHILDREN?

The long-term strength training progressions are included in the Progressions in Weightlifting chart below.



Progressions in weight lifting (Lloyd et al., 2012)

For the purpose of this section, we will focus on **Stage 1** and **Stage 2**.

Stage 1 = Fundamentals + Body Weight + Whole Body Movements

Stage 1 suggests that in young children the focus of strength development should start with children learning the fundamentals. This includes learning how to manage their own body weight competently and to perform whole body movements (e.g. squat, lunge, push-up, and crawl) in a controlled and coordinated manner.

There is a wide variety of ways to include these types of exercises into your sessions and the key is to keep it fun and challenging with plenty of variety. For example, the use of animal movements like the gorilla walk to develop a squat pattern or the bear crawl to develop upper body and trunk strength. We can also build circuits and obstacle courses.

Body weight strength exercises will allow children to develop a foundation from which more advanced strength development work can be done. For instance, the inclusion of additional external load and resistance can be introduced as children progress through adolescence and into adulthood.

For examples of activities you can do with kids at this stage please watch this video from the iCoachKids Conference

Stage 2 = Progress to Using Implements and Weights

After progressing from ground-based body weight exercise in Stage 1, elastic bands, medicine balls, suspension training and ultimately free weights (both dumbbells and barbells) may be introduced in Stage 2.

From Body Weight to External Loads

As youths become stronger and more technically competent, then higher intensity exercise such as weight lifting movements may be included. However, regardless of the type of strength exercise modality, performing the exercise with proficiency and correct technique is **ALWAYS** the most appropriate way to make strength development advances as this stage.

Always prioritise form, technique and safety

Therefore, it is recommended that when delivering strength sessions to youths, instruction and supervision should be provided by qualified adults who have an understanding of youth resistance training guidelines and who are knowledgeable of the physical and psychosocial uniqueness of children and adolescents.

Conclusion

To summarise, it is important to include **Strength Development** as part of a training programme for children at all stages of development. Strength training for young children should first focus on their ability to manage their own body weight competently and to perform whole body movements before progressing onto adding additional external loads such as resistance bands and barbells. Regardless of age and stage of development, the focus on correct technique should always be a priority.

Now, it is time for you to think how this plays out in your coaching context. Please move on to the reflective activities!

Personal Coaching / Coaching with Others

a) Using the template below design a session that includes some Strength Development activities. Make sure you evaluate the session once it is delivered. Identify the effectiveness of the Strength Development activities that were included; and what else you could include or progress.

b) Using the template below plan a training session with you fellow coaches, that includes some Strength Development activities. Evaluate the session also

Club:	**Age Group:**	**Date:**
Duration:	**No. of Children:**	**Equipment:**
Session Aim:		
Warm Up Activities:		**Strength Development:**
Main Activities:		**Strength Development:**
Cool-Down Activities:		**Strength Development:**
Session Evaluation:		
Evaluation – Strength Development:		

Chapter 4, Summary and Conclusions

VIEW AND/OR READ

You can view this section on the online MOOC: https://www.youtube.com/watch?v=CQwLZmib_aI or you can read it in the Study Guide. If it re-enforces your learning, you can do both.

Introduction

You have completed Chapter 4, **Motor Skill Development and Conditioning for Kids**.

In this chapter, we have explored what is **Motor Skill Development and Physical Conditioning** and how we can incorporate these two things within your coaching. Along the way, we have debunked some myths and misconceptions and highlighted the importance of these things for a happy and healthy life with sustained participation in sport and physical activity!

Specifically, we have introduced **Fundamental and Foundational Movement Skills**. Fundamental movement skills are the building blocks for more advanced movement and include **Locomotor, Object Control and Stability Skills**.

Foundational Movement Skills include these Fundamental Movement Skills but reflect a broader range of movements including cycling, swimming and resistance training.

Next, we introduced you to delivering **Physical Conditioning** and the eight **Athletic Movement Skill Competencies**.

We suggested these could be delivered through our **RAMPAGE Session Structure** providing opportunity for physical development across a coaching session.

Thirdly, we covered the development of the **Energy Systems** including **Explosive, High-Intensity and Endurance Efforts**. Ultimately, the more developed your energy systems – the more exercise you can do!

3 Energy Systems

- Explosive = Phosphagen
- High Intensity = Glycolytic
- Endurance = Oxidative

Our fourth and final section covered the area of **Strength Development**. Strength is simply the ability to exert force and has a range of health and performance benefits. This can be delivered in your coaching sessions by starting with children mastering control of their own body in a controlled and co-ordinated manner.

Strength = Ability to Exert Force = Health + Performance

Ok, again, nobody said that coaching kids was easy, but we hope this chapter gave you some great ideas to keep kids happy, fit and healthy and encourage a lifetime of sport and physical activity.

STUDY GUIDE TASK: QUIZ

1. Safe and Efficient Movement involves:

a) More injuries and less effort
b) Appropriate technique and maximum output with minimum energy
c) Basic techniques with maximum energy

2. Fundamental Movement Skills (more than one right answer):

a) Are the building blocks for more advanced and specialised movement
b) Include stability, object control and locomotor skills.
c) Contribute to enhanced health and sustained participation in sport and physical activity

3. Children's motor competence today is:

a) Higher than previous generations
b) Same as previous generations
c) Lower than previous generations

4. The 8 Athletic Motor Skill Competences (Chapter 4 Section 1 Part 2):

a) Guarantee a child will be a top athlete
b) Make children look older than they are
c) Provide a base for the development of the fundamental movement skills

5. The 8 Areas of Emphasis include (select all that apply):

a) Locomotor skills, multidirectional movement, lower, weight-lifting, joint mobility, changing speed and changing direction.
b) Locomotor skills, multidirectional movement, lower, upper body and trunk stability and strength, joint mobility, changing speed and changing direction.
c) Locomotor skills, multidirectional movement, lower, upper body and trunk stability and strength, joint mobility, and changing sports.

6. The high-energy molecule we use to create energy is called:

a) NBA
b) ATP
c) TNT

7. Which of the below statements correctly defines the 3 energy systems:

a) The phosphagen system produces energy slowly and gets depleted quickly too; The glycolytic system lasts up to 20 minutes but is inefficient and produces sugar; The oxidative system is quick, highly efficient and long-lasting
b) The phosphagen system produces energy quickly and is long-lasting too; The glycolytic system lasts up to a minute but is highly efficient; The oxidative system is the fastest, but it produces lots of toxic waste.
c) The phosphagen system produces energy quickly but gets depleted quickly too; The glycolytic system lasts up to a minute but is inefficient and produces waste; The oxidative system is slow, but highly efficient and long-lasting

8. When coaching children's energy system (more than one right answer):

a) Avoid exhaustion
b) Add variety and games to your conditioning sessions
c) Measure children's heart rate and power ratios every day

9. Strength training with children:

a) Should be avoided at all cost
b) Can only be done in a fully equipped gym
c) Is desirable and has many potential benefits

10. In children, strength gains are due to (more than one right answer):

a) Raising testosterone levels
b) Increased motor unit activation
c) Improved motor unit coordination

11. To develop strength, young children should

a) Lift free weights
b) Use body weight and whole-body movements
c) Take supplements

12. The most important thing when working on strength with children is:

a) Increasing weight as much as possible
b) Monitor muscle hypertrophy
c) Prioritise technique and safety

Q1

Safe and Efficient Movement involves:
b) Appropriate technique and maximum output with minimum energy

Q2

Fundamental Movement Skills (more than one right answer):
a) Are the building blocks for more advanced and specialised movement
b) Include stability, object control and locomotor skills.
c) Contribute to enhanced health and sustained participation in sport and physical activity

Q3

Children's motor competence today is:
c) Lower than previous generations

Q4

The 8 Athletic Motor Skill Competences (Chapter 4 Section 1 Part 2):
c) Provide a base for the development of the fundamental movement skills

Q5

The 8 Areas of Emphasis include (select all that apply):
b) Locomotor skills, multidirectional movement, lower, upper body and trunk stability and strength, joint mobility, changing speed and changing direction.

Q6

The high-energy molecule we use to create energy is called:
b) ATP

Q7

Which of the below statements correctly defines the 3 energy systems:
c) The phosphagen system produces energy quickly but gets depleted quickly too; The glycolytic system lasts up to a minute but is inefficient and produces waste; The oxidative system is slow, but highly efficient and long-lasting

Q8

When coaching children's energy system (more than one right answer):
a) Avoid exhaustion
b) Add variety and games to your conditioning sessions

Q9

Strength training with children:
c) Is desirable and has many potential benefits

Q10

In children, strength gains are due to (more than one right answer):
b) Increased motor unit activation
c) Improved motor unit coordination

Q11

To develop strength, young children should
b) Use body weight and whole-body movements

Q12

The most important thing when working on strength with children is:
c) Prioritise technique and safety

PERSONAL COACHING TASK / COACHING WITH OTHERS

Using the template below, design, deliver and evaluate coaching sessions, clearing identifying the **Athletic Motor Skills Competencies**, **Energy Systems** and **Strength Development** activities included. Do this Task both for your personal coaching and with the other coaches you work with.

Club:	**Age Group:**	**Date:**
Duration:	**No. of Children:**	**Equipment:**
Session Aim:		
Warm Up Activities:		**Motor Skills / Energy Systems / Strength Development:**
Main Activities:		**Motor Skills / Energy Systems / Strength Development:**
Cool-Down Activities:		**Motor Skills / Energy Systems /**

	Strength Development:
Session Evaluation:	
Evaluation – Motor Skills / Energy Systems / Strength Development:	

FURTHER VIEWING/READING

Sport Ireland Coaching, Coaching Children Workshops – Factsheets: https://www.sportireland.ie/coaching/coaching-children-workshop

Hulteen, R. et al., (2018) Development of Foundational Movement Skills: A Conceptual Model for Physical Activity Across the Lifespan, Sports Med, 48, 1533-1540

The Youth Physical Development Model - Reproduced from Lloyd & Oliver (2012) - Strength & Conditioning Journal

Avery Faigenbaum , Wayne L. Westcott (2009) Youth Strength Training

A Coach's Dozen: An Update on Building Healthy, Strong, and Resilient Young Athletes
https://www.researchgate.net/publication/315731254_A_Coachs_Dozen_An_Update_on_Building_Healthy_Strong_and_Resilient_Young_Athletes

One in four primary school children cannot run properly
https://www.irishtimes.com/news/education/one-in-four-primary-school-children-cannot-run-properly-study-says-1.4152197

Physical Literacy – Scoil Net
https://www.scoilnet.ie/pdst/physlit/

Well, coach, how do you feel? Congratulations! You have completed MOOC 2:

Child-Centred Coaching & Physical Literacy

You should be very proud of yourself. I'm sure the children you coach, and their families, are incredibly grateful that you took the time to do the course.

It's been a pleasure spending time with you and we hope you join us for MOOC 3 where we will continue to explore the best ways to give children a positive and fulfilling sport experience.

Thanks again! Keep Calm and Coach On!

MOOC 2

THE END