DIY Bike Education - Advanced bike skills and knowledge

Summary

In this module students incorporate additional communication skills to their repertoire of safe bicycle riding practices to ride safely on shared or separated paths, alone or in a group.

Opportunities are provided for students to refine the concepts of gear selection, execution of riding skills and further development of their situational awareness skills. See also *Links to Western Australian Curriculum* on page 12.

Year level: Years 4 – 6
Teaching and learning resource.

Minimum time required – 3 hours.

Bike skills

The development of peripheral awareness is conducive to targeting lessons to the middle to late childhood phase of development however skills such as the following may be appropriate for Year 2 upwards:

- Ways to maintain a balanced position.
- Development of basic cycling skills ensuring the use of large spaces such as school basketball courts or oval.
- Increased spacing between students when doing simulations.

A bike education instructor with students

Children can learn to ride from a young age and will copy the behaviours of their parents/carers/teachers when it comes to being safe as a cyclist.

Teachers need to be mindful and to make judgements regarding their students and should take into account the student's:

- Age.
- Cycling experience.
- Ability to perceive hazards.
- Perception of visual and auditory information.
- The fact that younger students need more space to perform skills.
- The distances involved.

Considerations - Cycling and the Law

The WA Police recommend that children under nine years of age do not ride on a road unless closely supervised by a responsible adult.

Riding bikes on footpaths

On April 27th 2016, WA's laws changed to allow cyclists of all ages to use footpaths, unless otherwise signed. The amendment to the Road Traffic Code 2000 brought WA's bicycle laws into line with the rest of Australia, making it legal for parents to ride alongside their children on footpaths, improving safety. Under the previous rules, only children under the age of 12 were able to ride on footpaths without breaking the law.

Helmets

It is compulsory for all cyclists to wear an approved helmet while in motion, unless exempted.

Learning outcomes

Students will be able to:

- Enhance their riding skills and situational awareness.
- Understand and apply the laws of physics to be able to perform emergency braking.
- Effectively select the appropriate gear to ride safely and efficiently regardless of the terrain.
- Use appropriate communication when riding in groups.
- Demonstrate shared path etiquette.
- Understand the essential scanning techniques and look behind when turning or overtaking.
- Scan ahead to anticipate potential hazards.
- Ride in a straight line.
- Use safe practices to perform emergency and non-emergency braking in a simulated scenario.
- Use safe cornering techniques to ride around corners or bends.
- Create a visual presentation that explains the concepts of gearing in relation to science and mathematical understandings.
- Create a visual presentation to highlight the techniques involved in.
    - Group riding.

- Scanning.
- Communication skills and queues for cycling.
- Braking techniques.

- Provide peer feedback on a range of skills using technology to collect, manage and analyse the data.
- Use an enquiry-based learning approach to solve challenges.
- Communicate quickly and clearly with other riders in a group situation and with other pathway users.

Preparation

Resources

- Students to bring bicycles and helmets from home.
- Use the Parental Consent form to encourage parents to pre-check students' bicycles.
- Access to large open space such as a basketball court, grassed park or cordoned-off car park.
- 12 cones, 4 squeaky toys and a whistle.

Teaching ideas

Teachers are encouraged to use a range of the teaching and learning ideas provided below. The teaching and learning ideas provide opportunities to address multiple learning areas. Teachers can modify and extend ideas for different year levels and phases of schooling.

Figure 1 - Illustration of the different components found on a bike

Activity 1 - What is emergency braking?

Using emergency braking techniques is a vital skill to learn. Emergency braking means stopping the bicycle abruptly due to unforeseen circumstances and still maintaining control over the bicycle. Students should practise the skill of emergency braking to embed the subconscious habit of reaction.

This activity requires students to have made braking with both brakes a habit as well as understanding basic laws of physics. When stopping the bicycle their body mass is still moving forward and somersaulting over the handlebars can be the consequence if not counteracted.

The same phenomenon occurs in cars and is the reason why passengers always wear a seatbelt. In an emergency braking situation a student will have to pre-empt this forward motion by pushing their body backwards.

Students discuss bike education theory with instructor

Ask the students

Q - What do we mean by emergency braking and what challenges do you foresee?

Get students to brainstorm situations in which they may need to stop unexpectedly and what may happen on their bicycle.

Explain to students what emergency braking is and practise stopping a bicycle quickly and unexpectedly. Show students how to do an emergency braking situation safely.

How to do emergency braking:

- Brace both arms.
- Push body weight to the back of the bike.
- Bottom back off the saddle and behind the line of the saddle.
- Cranks should be horizontal.
- Squeeze both brakes simultaneously, applying pressure sharply.
- Put the left foot on the ground as the bicycle stops.

Skill refinement activities

- Practise non-emergency stop whilst stationary and then by walking next to the bike and pushing it.
- Progress to practising the non-emergency technique riding in a straight line.
- Practise with gentle braking first, gradually applying the brakes more sharply and strongly.
- In pairs, students take turns at calling out a braking cue for partner to apply non-emergency brake.
- Decrease the designated stopping zone to challenge students - stop within designated stopping zone (marked out with cones or chalk) on the straight-line track.

- Demonstrate the emergency braking technique by holding the handlebar while a student assumes the correct position.
- Apply the brakes on cue from the teacher or a partner.
- Increase the complexity of the emergency reaction situation with unexpected hazards in front of the rider eg. including soft toys, or flat cones.
- Get students to ride in a circle with the task to stop when they hear the whistle. Start this practice at slow speed and increase speed.

Activity 2 - Why do I have gears & what do they do?

Gears enable riders to use the same amount of physical power regardless of whether they ride up-hill, down-hill, against or with the wind. Gears enable riders to decrease or increase the amount of resistance when pedalling.

Explain that the idea of shifting gears is to keep tension on the chain whilst maintaining rhythm.

The reason bikes have gears is so you can pedal comfortably no matter what the terrain. Shift to an easier gear (lower) on climbs or when you're riding into the wind. Shift to a harder (higher) gear when wanting more speed or going downhill.

The key on how to use your bicycle gears efficiently is to start by finding the right gear. This means you can keep a steady rate of pedalling, or cadence, without feeling like you are pushing too hard or too gently through the pedals.

Cross-chaining is when the chain is on the large chain wheel and the largest rear cog, or when the chain is on the small chain wheel and the smallest rear cog. This can damage the chain and is inefficient.

Changing gears

- The levers on the right-hand side are gear levers and the levers on the left-hand side are for the chain rings.
- The left-hand side levers are for significant changes. On the front, the bigger the chain ring, the more resistance you get.
- Gears on the right are for subtle changes and there is normally a range from low to high.
- The gears at the back are where you fine-tune your gearing. On the back, the bigger the cassette cog, the less resistance you get.
- Gears can only be changed when the rider is pedalling and the chain is in motion.
- Skill refinement: You need to be pedalling lightly and softly for the bike to shift smoothly. It’s called ‘soft pedalling’.
- If you are pedalling too forcefully, it will create a grinding noise or jump a gear and it won’t be a smooth gear change.

Depending on their bicycles, students may have levers or their shifters may form part of the grip and must be turned. For those with levers:

- On the right: the lever moved with the thumb decreases resistance. The index finger increases resistance.
- On the left: the lever moved with the thumb increases resistance; the index finger decreases it.

Understanding gearing

Show students what changing gears looks like on one bicycle. The levers on the left side operate the front chain rings, the right the back. Encourage students to explore their own bicycle when stationary by getting them to count the number of front and back.

Cross-curricular opportunity

Science involves making predictions and describing patterns and relationships.
1. Describe the relationship between the gears and chain rings.

2. Construct suitable data displays, with and without the use of digital technologies, from given or collected data. Include tables, column graphs and picture graphs where one picture can represent many data values to explain gearing.

Explore and explain how gears work on a bicycle

Students prepare and present a visual presentation that incorporates the concept of gearing and the associated science and mathematical understandings such as forces that can be exerted by one object on another through direct contact or from a distance.

Am I in the right gear?

Try experimenting with different gears on climbs, descents and even on the flat, as it will help your cycling efficiency – the aim is to cycle smoothly and feel a resistance that relates to the required tension on the chain.

E.g. Explore their gears by getting students to ride in a circle and ask them to set their bicycle on the setting with the most resistance.

Putting theory into practice – gear selection:

- on command
- uphill
- undulating terrain
- chicanes
- corners
- simulation course

Group activity

Revisit the power-push off game now incorporating gears

Begin by lining students up on one side of the riding area. Get them to choose their preferred gear setting, and start their bicycles on the signal. Then allow them to glide as far as their push-off can move them before coming to a stop.

Who has travelled furthest?

Get the students to share what gear setting they have used and in the second round encourage them to try a different technique.

Activity 3 - Communicating when riding in a group

Ask the students

"What verbal and non-verbal skills do people use when cycling to enhance safety?"

- Get the students to brainstorm and then explore this idea further using the internet to assist.
- Create a list of verbal and non-verbal skills.

Good verbal communication adds another level of safety for each group member. As bicycles don't have stopping lights it is vital for riders in groups to tell their team members behind them that they are about to 'stop' or 'slow down'. This is the most basic verbal cue each team member must know and use.

A family riding in a group.

Further, the role of communication is to give group members a heads-up of things they may not be able to see yet. Common Australian sports rider terminology used includes:

- 'bike up' for oncoming traffic
- 'bike back' or 'car back' for traffic approaching from the rear
- 'passing' when overtaking other members of the group
- 'ease-up' to reduce the pace
- 'speed-up' to go faster

Communication is important to keep the group together and travel at a speed that is comfortable for everyone.

Divide class into small groups of 5 or 6

Each group is given an envelope with 4 or 5 communication skills written on the card.

Students take turns at being the lead cyclist and practising the verbal and non-verbal cues.

Activity 4 - Slalom course: Cornering

Cone cornering

Tight cornering requires that you lean the bike over a little bit.

Set up a series of cones, or similar objects, for students to weave through each spaced about 3 metres apart. As their skill improves, encourage students to go faster, or move the cones out of a straight line so that they are staggered, and students are required to turn more to get around each cone.

- Decrease distance between cones.
- Time each slalom run.
- Time penalty is given for hitting, missing or going to wide around cone.

Activity 5 - Riding on shared paths

Bicycles can ride on footpaths and shared paths. However, these are shared spaces and rules apply[1]:

- Pedestrians always have right of way and bike riders must ride so that they can always stop safely for them.
- Bike riders must signal at intersections and give way to motor vehicles entering or exiting an intersecting road.
- Bike riders must travel in single file on all paths, though they can travel two abreast on a road.
- Bike riders must not ride carelessly or recklessly. Riding recklessly includes riding at a speed that places other riders and pedestrians at risk.
- When riding on a footpath, bicycle path, separated path or shared path, the rider of a bicycle must keep to the left of any on-coming bicycle rider.

Riding on a shared path

A rider of a bicycle must keep left and give way to pedestrians on a shared path.

Riding on a separated path

A rider of a bicycle must not ride on the pedestrian side of a separated path. The rider of a bicycle must not ride on the road or footpath to which a no bicycle sign applies. The rider can dismount and walk the bicycle.

Ask the students

Q - What rules do you already know about that apply to riding a bicycle?

Get them to brainstorm rules they already know.

Encourage students to think about how else they used footpaths and shared paths – for example, they may be walking, scooting or playing on paths in their street.

Q - How does it feel for a person walking on a path to be passed by a rider who didn't ring their bell?

[1] Department of Transport: http://www.transport.wa.gov.au/mediaFiles/active-transport/AT_P_CyclingRulesWABooklet.pdf

Get students to empathise with different path users to reiterate the usefulness of rules.

Extension - Activity 6 - ICT feedback

Small group activity

Students use Information and communication technology (ICT) to give feedback to a partner or group.

Feedback can be via watching and analysing a video or annotating images taken at the preparation, execution and follow-through phase of the skill.

Use technology to provide feedback to each member of your group regarding:

- Group riding.
- Shared path etiquette.
- Separated path etiquette.
- Cornering.
- Gear selection.
- Smoothness and rhythm.
- Verbal and non-verbal communication skills.
- Safety skills.
- Bike handling.

Task: Collecting, managing and analysing data

Collect and present different types of data for a specific purpose using software – eg video, image with analysis, etc.

Extension - Activity 7 - Sports education model

Student initiated and facilitated - student driven

Using the Sports Education model (SEPEP), students take on organisation, leadership and management duties.

Background/rationale

Students assign, explore and perform the duties and responsibilities of different roles for a range of positions and play patterns.

Design a rubric to assess the following aspects of sports education co-operation, participation, teamwork and leadership.

Tasks

- Students identify the skills that they want to focus on in the obstacle course.
- Provide opportunities to practise the skills.
- Design the obstacle course and create a map.

- Design a process to form teams with consideration to team members consisting of mixed ability, evenly matched, teams.
- Students design the scoring system, rules, determine team size and obstacle grid zone.

Reflection

How can you analyse and monitor communication skills, leadership skills, teamwork skills and decision-making skills?

Safety audit and scan

Prior to the obstacle course taking place in small groups conduct a safety audit on considerations and requirements to minimise risk and enhance safety. Ensure practical measures are included that can be easily adopted to ensure activities can be undertaken safely.

Extension - Activity 8 - The puzzle

Students create a flyer using ICT, canvas or print to promote elements and safety considerations of shared or separated path use between pedestrians and bike riders.

Students can research the specifics around shared path guidelines and design at:

http://www.transport.wa.gov.au/mediaFiles/projects/PROJ_P_Cycling_Network__Plan.pdf

Extension - Activity 9 - Group ride

Simulate a social ride in which everybody travels in single file with one metre distance apart. Number each member of the group. The activity's goal is to ride as a group and use verbal communication.

- Call out students' numbers whose task it is to overtake the group and take the lead.
- The leader can choose the riding direction and must consider the group's speed.

Learning area concepts and skills

Health and Physical Education

- Strategies for safety.
- Minimising risk.
- Ways to maintain a balanced position when connecting movements.
- Ways to maintain a balanced position while performing various skills.
- Movement skills that combine the elements of effort, space, time, objects and people.
- Practise and refine fundamental movement skills in different movement situations.
- Practise specialised movement skills and apply them in different movement situations.
- Perform movement sequences which link fundamental movement skills.
- Design and perform a variety of movement sequences.
- Combine the elements of effort, space, time, objects and people when performing movement sequences.

- Manipulate and modify the elements of effort, space, time, objects and people to perform movement sequences.
- Apply innovative and creative thinking in solving movement challenges.
- Apply critical and creative thinking processes to generate and assess solutions to movement challenges.

Science

- Apply concepts push and pull effects, reaction times, braking to riding a bicycle safely.
- Distances – motion and inertia in relation to speed and braking.
- Distances - forces involved in bicycle crashes and helmet safety standards.

Mathematics

- Data representation.
- Prediction.
- Simple analysis and interpretation.
- Measurement of braking.
- Comparison data.
- Distances under different conditions.
- Understanding.
- Fluency.
- Reasoning.
- Problem solving.

English

- Writing.
- Creating text.
- Recount.
- Oral presentation.
- Writing and presenting a summary of findings.

The Arts

- Drawing and constructing models of bicycles.
- Timelines - 3D and visual art forms.

Technologies

- Creating solutions.
- Using technology.
- Collaborating and managing.
- Collecting, managing and analysing data.

A teacher and students doing a bike education session.

Links to the Western Australian Curriculum

Table 1: Health and Physical Education

Strand	Sub-strand
Personal, social and community health	• Contributing to healthy and active communities
Movement and physical activity	• Moving our body • Understanding movement • Learning through movement

Table 2: English

Strand	Sub-strand
Literacy	• Interacting with others • Creating texts

Table 3: Science

Strand	Sub-strand
Science understanding	• Physical science
Science as Human Endeavour	• Nature and development of science
Science inquiry skills	• Questioning and predicting • Planning and conducting • Processing and analysing data and information • Communicating

Table 4: Mathematics

Strand	Sub-strand
Statistics and probability	• Data representation and interpretation
Measurement and Geometry	• Units of measurement

Table 5: The Arts: Visual arts

Strand	Sub-strand
Making	• Developing skills and processes • Production

Table 6: Technologies: Digital Technologies

Strand	Sub-strand
Processes and production skills	• Collecting, managing and analysing data
Creating solutions	• Investigating and defining

General capabilities

- Literacy, critical and creative thinking, personal and social capability
- Numeracy, information and communication technology (ICT)

Cross-curriculum priorities

- Sustainability