

Cover Page.

For this assignment I have used the following: -

Part 1: Photograph

Part 2: Discuss the environment

Part 3: Risk Assessment

Part 4: Evaluation

Statement for the use of AI.

I acknowledge the use of Co-pilot between 01.09.26-21.09.26 to research and to proofread.

I used the prompt(s):

1. Google image
2. Welsh Government
3. Theorists Work
- 4, Proof Reading

Part 1.

Google image: - Gwersyll yr Urdd Llangrannog fydd cartref Eisteddfod T 2021 - Herald. Wales

Part 2:**Exploring Forces Through Skiing and Zip Wire Activities at Llangrannog****Introduction**

The photograph of Llangrannog Outdoor Education Centre shows a unique learning environment consisting of open green spaces, steep slopes, and outdoor adventure facilities, including a dry ski slope and zip wire. Such environments provide valuable opportunities for children to develop scientific understanding through first-hand experiences. Rather than learning scientific concepts solely through classroom-based activities, children can observe, experience, and investigate scientific ideas within authentic contexts.

This learning story focuses on the concept of forces, specifically gravity, friction, and air resistance, and explores how Year 6 children aged 10 to 11 years can develop understanding through participation in skiing and zip wire activities. The environment provides opportunities for children to ask questions, make predictions, investigate ideas, and reflect on their observations. In addition, the activities create opportunities to apply mathematical skills through measuring, comparing, and recording results. The experiences align with the Curriculum for Wales, which encourages learners to become ambitious, capable learners who are curious about the world around them (Welsh Government, 2022).

Learning Story 1: Exploring Gravity and Friction Through Skiing

A group of children gather at the top of the dry ski slope. Before beginning the activity, the instructor encourages the children to think about what might happen when they start moving downhill.

Instructor: "What do you think makes a skier move down the slope?"

Child A: "The skis slide."

Child B: "The hill pushes you."

Child C: "Because you're going downhill."

The children begin skiing and quickly notice that not everyone travels at the same speed. Some children move quickly, while others travel more slowly depending on their body position.

After the first run, the group reflects on what they noticed.

Child D: "When I leaned forwards, I felt much faster."

Child E: "I slowed down when I turned sideways."

The practitioner uses questioning to encourage further thinking.

Practitioner: "Why do you think turning sideways made you slower?"

Child E: "Maybe the skis were rubbing against the surface more."

This discussion provides an opportunity to introduce the idea of friction. The children begin to understand that some surfaces and movements create more resistance than others, causing movement to slow down.

To extend learning, the practitioner introduces a simple investigation using toy cars. The children compare how far the cars travel on different surfaces.

Surface	Distance Travelled
Grass	3 metres
Tarmac	8 metres
Smooth ramp	12 metres

The children discuss the results.

Child A: "The car travelled furthest on the ramp."

Child B: "The grass stopped it."

Practitioner: "Why do you think the grass slowed it down?"

Child C: "Because it is rough."

The practitioner encourages the children to compare the movement of the toy cars with their skiing experience. They begin to recognise that friction affects how objects move.

The ski slope also provides opportunities to investigate gravity. Children observe that objects placed on the slope move downwards. The practitioner encourages prediction before testing ideas.

Practitioner: "If I place the ball here, which direction will it travel?"

All the children predict that the ball will roll downhill.

The practitioner places several different objects on the slope and encourages the children to observe what happens. Through direct experience, the children develop an understanding that gravity pulls objects towards the ground and influences movement. Rather than reading about gravity from a textbook, they can see the effects of the force in action.

The children begin asking further questions:

- Would a heavier object move faster?
- Would a steeper slope make objects travel further?
- Would different surfaces change the speed?

These questions demonstrate growing curiosity and encourage further investigation.

Learning Story 2: Understanding Air Resistance Through the Zip Wire

Later in the day, the children participate in the zip wire activity. This experience provides another opportunity to explore forces in action.

While waiting for their turn, the practitioner encourages discussion.

Practitioner: "What force do you think helps you move from one end of the zip wire to the other?"

Child A: "Gravity."

Practitioner: "Does anything try to slow you down?"

Child B: "The wind."

Child C: "The rope."

The children are encouraged to make predictions before taking part.

After completing the activity, they share their observations.

Child D: "I went really fast at the beginning."

Child E: "I slowed down near the end."

The practitioner uses these observations to introduce the concept of air resistance.

Practitioner: "Why don't you keep moving forever?"

Child F: "Because something slows you down."

This provides an opportunity to discuss how air pushes against moving objects. The practitioner explains that air resistance acts in the opposite direction to movement and gradually slows people down.

The children compare experiences and begin asking their own questions:

- Why were some children faster than others?
- Does body position change speed?
- Does starting height affect movement?
- What would happen if the cable were flatter?

To develop understanding further, the children use stopwatches to record journey times.

Child	Time Taken
Child A	8 seconds
Child B	7 seconds
Child C	9 seconds

The results encourage discussion and mathematical thinking.

Practitioner: "Who travelled the fastest?"

Child A: "Child B."

Practitioner: "Why might that have happened?"

The children offer different ideas and begin making links between speed, height, and body position.

Through questioning and discussion, the practitioner supports scientific enquiry without immediately providing answers. Instead, children are encouraged to investigate, compare results, and develop explanations based on evidence. This reflects the principles of enquiry-based learning promoted within the Curriculum for Wales.

Extending Learning Opportunities

Several additional resources could be used to enhance learning and encourage further exploration of forces.

These may include:

- Stopwatches for recording times.
- Measuring tapes for comparing distances.
- Whiteboards for recording predictions.
- Tablets for taking photographs and videos.
- Graph paper for presenting results.
- Different ramp surfaces for testing friction.

Children could compare how different surfaces affect movement or investigate whether steeper slopes influence speed. Results could be recorded in tables, charts, and graphs, creating opportunities to apply mathematical skills in meaningful contexts.

For example, children could measure the distance travelled by a toy car on different surfaces and compare their findings. They could also use stopwatches to investigate how long it takes objects to travel down different slopes. These activities encourage children to collect data, identify patterns, and draw conclusions from their observations.

Links to the Curriculum for Wales

The activities support the Science and Technology Area of Learning and Experience by encouraging children to ask questions, make predictions, observe outcomes, and evaluate evidence. Through direct experiences of gravity, friction and air resistance, children develop scientific understanding in meaningful and engaging ways.

The experiences also support the Mathematics and Numeracy Area of Learning and Experience. Children measure distances, compare times, record results, and identify patterns in data. Mathematical concepts become meaningful because they are linked to authentic experiences.

The Health and Well-being Area of Learning and Experience is also evident. Children develop confidence, resilience and perseverance whilst participating in challenging activities. They learn to manage risk responsibly and reflect on their own performance.

The learning experiences contribute to the Four Purposes by helping children become:

- Ambitious, capable learners.
- Enterprising, creative contributors.
- Ethical, informed citizens.
- Healthy, confident individuals.

Conclusion

The ski slope and zip wire at Llangrannog provide valuable opportunities for children to explore the forces of gravity, friction, and air resistance through direct experience. Through observation, prediction, investigation and discussion, children develop scientific understanding in ways that are meaningful and memorable. The activities also support mathematical development through measuring, comparing, and recording results.

The outdoor environment encourages curiosity and enquiry while providing opportunities for practitioner support through questioning and discussion. As a result, children can connect scientific ideas with real-world experiences, making learning more engaging and relevant. This demonstrates how outdoor environments can be used to support the development of scientific understanding through active exploration and discovery.

Part 3: Risk-Benefit Assessment of the Outdoor Environment at Llangrannog

Introduction

The photograph of Llangrannog Outdoor Education Centre shows a large outdoor environment consisting of open grassy spaces, adventure facilities, pathways, roads, and sloping terrain. Outdoor environments provide valuable opportunities for children to develop confidence, resilience, physical skills, and problem-solving abilities. However, participation in outdoor learning also presents potential hazards that require careful consideration. A risk-benefit assessment recognises that some level of risk is unavoidable and, when appropriately managed, can contribute positively to children's learning and development. Unlike a traditional risk assessment, a risk-benefit assessment considers both the hazards and the developmental value of activities. This assessment considers the potential risks and benefits associated with Year 6 children accessing the outdoor environment at Llangrannog.

Potential Risk: Sloping Terrain and Uneven Ground

The photograph clearly shows significant slopes and uneven surfaces throughout the site. Children may trip, slip, or fall while walking, running, or participating in outdoor activities. Wet weather conditions may increase this risk by making surfaces more difficult to navigate.

Control Measures: -

- Adult supervision during outdoor activities.
- Clear boundaries identified before activities begin.
- Suitable footwear worn by all participants.
- Pre-activity safety briefings.
- Regular inspection of activity areas.

Benefits

Although uneven ground presents a potential hazard, it also provides valuable opportunities for learning and development. Moving across slopes helps children develop balance, coordination, and spatial awareness. It encourages them to judge distances, adapt their movements and make decisions about their own safety. Whilst

minor injuries may occur, removing this challenge would limit opportunities to build confidence and physical competence. Therefore, the benefits outweigh the risks when appropriate supervision is in place.

Potential Risk: Adventure Activities (Zip Wire and Ski Slope)

The ski slope and zip wire present a higher level of risk than everyday playground activities. Potential hazards include falls, collisions, equipment misuse, and injuries associated with speed and movement. These activities require children to participate in physically demanding experiences and challenge themselves beyond their comfort zones.

Control Measures: -

- Qualified instructors lead all activities.
- Safety equipment such as helmets is provided and worn correctly.
- Equipment is regularly inspected and maintained.
- Children receive clear instructions before participation.
- Activities are adapted to suit individual abilities.
- Staff monitor participation throughout the activity.

Benefits

Although these activities involve inherent risks, they provide significant developmental benefits. Children are encouraged to challenge themselves physically and emotionally within a supervised environment. Participation can strengthen confidence, resilience, and perseverance. The activities also offer opportunities to experience concepts such as gravity, friction, and air resistance first-hand, helping children connect classroom learning with real-life experiences. Consequently, the benefits outweigh the risks when appropriate safeguards are maintained.

Potential Risk: Roads, Vehicles and Movement Around the Site

The photograph shows roads and vehicle access routes located near buildings and activity areas. Risks may arise when children move between activities or when coaches and service vehicles access the site. Without appropriate supervision, there is potential for accidents involving pedestrians and vehicles.

Control Measures: -

- Designated pedestrian routes.
- Adult supervision during movement around the site.
- Clear procedures for arrival and departure.
- Restricted vehicle movement during peak activity times.
- Safety briefings regarding road awareness.
- Clear signage and meeting points.

Benefits

Although roads and vehicle access points present potential hazards, they also provide opportunities for children to develop responsibility and safety awareness. Learning to move safely within shared spaces helps children understand the importance of following instructions and making informed decisions. Therefore, the experience contributes positively to developing independence and personal responsibility.

Potential Risk: Weather Conditions

As an outdoor centre situated in a coastal environment, Llangrannog is exposed to a variety of weather conditions. Participants may experience rain, intense winds, cold temperatures, bright sunlight, or rapidly changing weather. Adverse weather conditions may increase the likelihood of slips, discomfort, dehydration, or reduced visibility.

Control Measures

- Monitoring weather forecasts before activities.
- Appropriate outdoor clothing and footwear.
- Access to water, shelter, and rest facilities.

- Adaptation or cancellation of activities when necessary.
- Ongoing communication between staff and instructors.
- Encouragement of regular hydration and rest breaks.

Benefits

Challenging weather conditions can provide valuable learning experiences. Exposure to changing weather helps children develop adaptability, resilience, and critical thinking skills. Children learn the importance of preparation and recognise how environmental conditions can affect activities. These experiences contribute to confidence and a greater appreciation of the outdoor environment.

Educational Benefits of Managed Risk

A risk-benefit approach recognises that challenge is an important aspect of children's development. Opportunities to experience manageable levels of risk encourage confidence, independence, and decision-making. At Llangrannog, children are supported to assess situations, follow instructions, and take responsibility for their actions. Working together during activities also promotes communication, teamwork, and mutual respect. These experiences help children develop positive attitudes towards safety while building resilience and self-confidence.

It is important that practitioners manage risks rather than remove them entirely, enabling children to experience challenge within a safe and supportive environment. Through this approach, children learn how to assess situations, respond appropriately, and develop confidence in their own abilities.

Conclusion.

The outdoor environment at Llangrannog contains a range of potential hazards, including uneven terrain, adventurous activities, vehicle movement, and changing weather conditions. However, these risks can be managed through supervision, clear procedures, specialist instruction, and appropriate equipment. The environment supports children's physical, emotional, social, and cognitive development by encouraging independence, resilience, problem-solving, and responsible decision-making.

Whilst some risks remain unavoidable, they are outweighed by the significant developmental and educational benefits offered by the outdoor environment. Therefore, it can be concluded that the educational, developmental and wellbeing benefits of accessing the Llangrannog environment outweigh the identified risks when effective control measures are implemented. A balanced risk-benefit approach enables children to experience challenge, develop resilience and gain valuable learning experiences whilst remaining safe and supported.

Part 4.

Evaluation.

Introduction

Outdoor environments provide unique opportunities for young children to engage with mathematical and scientific concepts through active exploration, investigation, and play. Unlike formal classroom environments, outdoor spaces allow children to experience learning in meaningful and practical contexts, supporting the development of problem-solving, reasoning, and inquiry skills. **The Early Years Foundation Stage (EYFS) (DfE, 2024)** recognises the importance of outdoor learning in supporting children's understanding of the world and mathematical development. However, learning does not occur simply because children are outdoors. Adults play a crucial role in designing environments, observing children's interests, providing appropriate resources, and engaging in meaningful interactions that extend children's thinking.

This essay evaluates how adults support and encourages children's engagement with mathematical and scientific concepts in outdoor environments. It draws upon key theories including those of Piaget, Vygotsky, Bruner, and Froebel, alongside approaches such as Reggio Emilia, to critically examine the value of loose parts, affordances, child-led play, observation, curiosity and sustained shared thinking. The discussion will also consider barriers to outdoor learning and the importance of managing risk rather than eliminating it completely.

Outdoor Learning as a Context for Mathematical and Scientific Development

Research suggests that outdoor environments offer rich opportunities for developing early mathematical and scientific understanding. **Bilton (2010)** argues that outdoor learning allows children to interact physically with materials and natural phenomena in ways that are difficult to replicate indoors. Children naturally encounter mathematical concepts such as measurement, number, shape, pattern, and spatial awareness through activities including collecting objects, constructing structures, and navigating space. Similarly, science concepts emerge through observing weather, investigating plants and animals, exploring forces, and examining changes in materials.

Piaget's theory of cognitive development supports this view. **Piaget (1952)** argued that young children construct knowledge through active engagement with their environment. Children learn through processes of assimilation and accommodation, adapting existing schemas as they encounter new experiences. Outdoor environments provide opportunities for this hands-on learning because children can manipulate, explore and investigate real objects. For example, children pouring water between containers develop understanding of volume and capacity while simultaneously testing scientific ideas about cause and effect.

However, Piaget has been criticised for placing greater emphasis on independent discovery than on social interaction. Whilst outdoor experiences provide opportunities for exploration, children often require adult support to deepen their understanding and extend emerging concepts. This suggests that effective outdoor learning depends on both child-led exploration and skilled adult intervention.

Loose Parts and Mathematical and Scientific Inquiry

One important strategy adult use to support learning outdoors is the introduction of loose parts. **Nicholson's (1971)** Theory of Loose Parts suggests that environments containing open-ended materials encourage creativity, experimentation, and problem-solving. Examples include sticks, stones, tyres, shells, crates, and logs.

From a mathematical perspective, loose parts provide opportunities for counting, sorting, comparing, pattern-making and measuring. Children arranging stones into groups may begin comparing quantities, whilst creating patterns from leaves supports early algebraic thinking. Scientific learning also emerges as children test stability, balance, gravity, and material properties.

Daly and Beloglovsky (2015) argue that loose parts support greater levels of creativity and higher-order thinking than fixed resources because they do not prescribe a specific outcome. Children must formulate their own questions, test their own theories, and solve problems independently.

Adults support this process by carefully selecting resources, observing children's interests, and extending learning through conversation. For example, when children build a ramp using wooden planks, adults may encourage mathematical reasoning by asking questions about length, height, and distance. Similarly, scientific thinking

may be extended through discussions about why some objects move faster than others.

However, the effectiveness of loose-part provision depends on practitioner knowledge. Simply providing resources does not guarantee learning. Adults must recognise opportunities to scaffold children's thinking and introduce appropriate mathematical and scientific vocabulary.

Affordance and the Outdoor Environment

The concept of affordance provides another useful framework for understanding outdoor learning. **Gibson (1979)** defined affordances as the opportunities for action that an environment offers individuals.

Outdoor environments naturally contain numerous affordances that can promote mathematical and scientific learning. Slopes afford rolling, climbing, and measuring. Trees afford observing growth, comparing sizes, and investigating living things. Puddles afford opportunities to explore capacity, floating, sinking and reflection.

The Llangrannog risk-benefit assessment provides a useful example of affordance in practice. Although sloping terrain presents some potential risk, it also allows children to develop spatial awareness, judge distances and investigate movement. Children learn through physically engaging with the environment rather than simply receiving information from adults.

This perspective links strongly with contemporary outdoor learning research, which suggests that natural environments encourage deeper engagement and inquiry than highly structured settings (**Maynard & Waters, 2007**). However, affordances are not always recognised by children independently. Adults play a key role in drawing attention to learning opportunities and helping children make connections between their experiences and mathematical or scientific ideas.

Open-Ended and Child-Led Play

Play has long been recognised as a fundamental component of early learning. **Bruner (1966)** viewed learning as an active process in which children construct understanding through discovery and exploration. Child-led play is particularly

significant within outdoor environments because it enables children to investigate concepts that are meaningful and relevant to their interests.

For example, children collecting insects may begin classifying organisms, counting specimens, and comparing characteristics. Through these activities they engage simultaneously with scientific inquiry and mathematical thinking.

Adults working within child-led approaches adopt the role of facilitator rather than instructor. Instead of directing activities towards predetermined outcomes, practitioners respond to children's interests and support their investigations. Such practice reflects the principles of the Reggio Emilia approach, which views children as capable learners who actively construct knowledge (**Malaguzzi, 1998**).

One strength of child-led play is that it increases motivation and engagement. When children pursue their own interests, learning becomes authentic and meaningful. However, critics argue that exclusive reliance on child-led learning may result in gaps in curriculum coverage. Consequently, effective practice often requires a balance between children's interests and intentional adult planning.

Sustained Shared Thinking

Research consistently highlights the importance of adult-child interactions in promoting learning. **Siraj-Blatchford et al. (2002)** identified sustained shared thinking as one of the most crucial features of effective early years practice.

Sustained shared thinking occurs when adults and children work together to solve problems, explore ideas and develop understanding. Rather than providing answers, adults encourage children to think critically through questioning and discussion.

For example, if a child notices that one object rolls faster down a slope than another, the adult may ask:

- Why do you think that happened?
- What might happen if we changed the slope?
- How could we test your idea?

Such interactions support scientific inquiry because children are encouraged to predict, observe, evaluate, and draw conclusions.

This approach aligns closely with **Vygotsky's (1978) concept of the Zone of Proximal Development (ZPD)**. Vygotsky argued that children achieve higher levels of thinking when supported by knowledgeable adults. Through scaffolding, practitioners help children develop understanding that would be difficult to achieve independently.

The Llangrannog risk-benefit assessment demonstrates the importance of adult scaffolding in challenging environments. Activities such as zip wires and ski slopes involve scientific concepts including gravity, friction, and force. Adult guidance enables children to understand these experiences whilst participating safely. Therefore, adults act not only as supervisors but also as facilitators of scientific and mathematical learning.

Observation and Responsive Pedagogy

Observation is a key strategy through which adults support learning outdoors. By observing children closely, practitioners gain insight into children's interests, existing knowledge, and emergent understanding.

Observation enables adults to identify teachable moments and provide experiences that build on children's current thinking. For example, noticing children repeatedly sorting natural objects may lead practitioners to introduce classification activities involving shape, colour, or size.

Observation is particularly important within Reggio Emilia-inspired practice, where careful documentation of children's thinking informs future planning. **Malaguzzi (1998)** argued that listening to children is fundamental to understanding how learning develops.

Effective observation also allows adults to identify misconceptions that may otherwise remain unnoticed. If children believe that heavier objects always fall faster than lighter ones, practitioners can design investigations that challenge and extend this understanding.

However, observation requires both time and skill. Staffing pressures, paperwork requirements, and large group sizes may limit opportunities for practitioners to engage in meaningful observation and reflection.

Curiosity, Discovery, and Scientific Enquiry

Curiosity is often regarded as the foundation of scientific thinking. Froebel believed that children learn best through active engagement with nature and direct exploration of the world around them (**Froebel, 1887**).

Outdoor environments naturally stimulate curiosity because they contain constantly changing elements such as weather, plants, animals, and seasonal changes. These experiences encourage children to ask questions and investigate answers.

Adults support curiosity by creating environments that invite exploration and by responding positively to children's questions. Rather than immediately providing answers, practitioners may encourage children to investigate further.

The Llangrannog assessment highlights how changing weather conditions can become learning opportunities. Wind, rain and sunlight enable children to observe environmental change, test predictions, and develop scientific explanations. Such experiences encourage inquiry-based learning, which research suggests promotes deeper understanding than didactic teaching methods (**Johnston, 2014**).

Curiosity-driven learning also supports mathematical development. Children may compare rainfall levels, measure shadows, or estimate distances travelled during outdoor activities. Thus, science and mathematics often become interconnected within outdoor investigations.

Risk, Challenge and Learning

An important consideration when discussing outdoor learning is the role of risk. Traditional approaches often focus on hazard avoidance; however, contemporary research increasingly advocates for a risk-benefit approach.

The Llangrannog assessment demonstrates how managed risk contributes positively to development. Although uneven terrain, weather conditions and adventurous activities present potential hazards, these same features support resilience, confidence, and problem-solving.

From a mathematical perspective, navigating slopes encourages children to judge distances and assess spatial relationships. From a scientific perspective, activities such as zip wires provide firsthand experiences of forces and motion.

Froebel's philosophy emphasised that children should experience challenge and engage actively with the natural world. Similarly, contemporary outdoor learning research suggests that excessive risk aversion may reduce opportunities for exploration and inquiry (**Gill, 2007**).

Adults therefore have a responsibility not only to keep children safe but also to ensure that valuable learning opportunities are not removed unnecessarily. Effective practitioners manage risk through supervision, clear boundaries and appropriate resources whilst preserving opportunities for challenge.

Barriers and Challenges

Despite its benefits, several barriers can limit children's mathematical and scientific learning outdoors.

A significant challenge is practitioner confidence. Research indicates that many early years practitioners report lower confidence in teaching science than other curriculum areas (**Johnston, 2014**). Limited subject knowledge may reduce their ability to identify learning opportunities or extend children's thinking effectively.

Environmental constraints also affect provision. Not all settings have access to natural landscapes or extensive outdoor spaces. Urban environments may offer fewer opportunities for exploration, investigation and contact with nature.

Weather can present additional challenges. Although outdoor advocates argue that most weather conditions can support learning, some practitioners remain reluctant to provide regular outdoor access in adverse conditions.

Risk-averse cultures within some settings may further restrict opportunities for exploration. Concerns regarding health and safety can result in over-structured activities that limit children's autonomy and inquiry.

Finally, curriculum pressures may lead adults to prioritise measurable outcomes over open-ended learning experiences. This can undermine the child-led nature of outdoor exploration and reduce opportunities for sustained shared thinking.

Conclusion

Adults play a crucial role in supporting children's engagement with mathematical and scientific concepts in outdoor environments. Through the provision of loose parts,

recognition of environmental affordances, support for child-led play, careful observation and sustained shared thinking, practitioners create opportunities for meaningful exploration and inquiry. The theories of Piaget, Vygotsky, Bruner, and Froebel, alongside the Reggio Emilia approach, all highlight the importance of active, socially supported learning.

The Llangrannog risk-benefit assessment further demonstrates that outdoor environments offer significant educational value when risks are carefully managed rather than eliminated. Challenging features such as slopes, changing weather and adventurous activities provide authentic opportunities for mathematical reasoning, scientific investigation, and problem-solving. Although barriers such as practitioner confidence, safety concerns and environmental limitations remain, research suggests that high-quality adult support can enable children to engage deeply with mathematical and scientific concepts. Effective outdoor pedagogy balances freedom, curiosity, and challenge with sensitive adult guidance, allowing children to become confident, capable, and inquisitive learners.

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