Oide

Tacú leis an bhFoghlaim Ghairmiúil i measc Ceannairí Scoile agus Múinteoirí

Supporting the Professional Learning of School Leaders and Teachers

Engineering

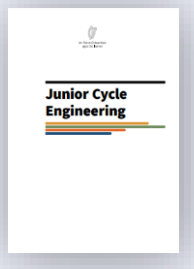
Professional Learning Booklet

2024-2025

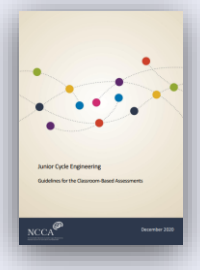
Oide
Tacú leis an bhFoghlaim Ghairmiúil i measc Ceannairí Scoile agus Múinteoirí
Supporting the Professional Learning of School Leaders and Teachers

Useful Links

Junior Cycle Engineering Specification
https://tinyurl.com/2n7k8v9d



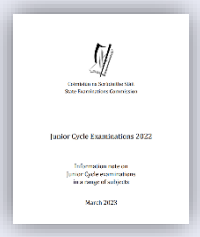
Assessment Guidelines
https://tinyurl.com/2dmnnyxp



Assessment Arrangements 2024/2025
https://tinyurl.com/z3afy5jb

CBA Key Dates 2024/2025
https://tinyurl.com/3mu6dpku

State Examinations Commission Junior Cycle information note
https://tinyurl.com/4m3t8p4p



Link to PLE materials
https://tinyurl.com/2mawhwjm

Oide Tacú leis an bhFoghlaim Ghairmiúil i measc Ceannairí Scoile agus Múinteoirí Supporting the Professional Learning of School Leaders and Teachers

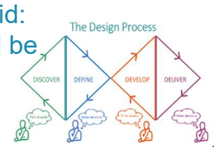
Engineering – Flood Defence System Name: _____

Use this page to show your research about the topic, try to explore a wide range of research and be creative in the way you present your findings.

The 'Sráid Oide' Community have commissioned you to design a flood defence system in order to protect their homes, businesses, church, and civic amenities. This flood defence has to have a mechanism for easy storage of it when not in use. They are looking to submit your design to Cork Co. Council so any design decisions will have to be justified

Having Viewed the accompanying video and using your card model as an aid:

- Design and engineer a prototype for a flood defence system that could be used to protect the street in the event of a flood occurring.
- Justify your design decisions taken during the process.



Success Criteria for Research- *My research should*:

- Come from a variety of trusted sources
- Contain primary and secondary sources
- Be relevant to the task
- Have up to date information

Primary Research: (Using your card model)

Communicate some methods that might be suitable to prevent water entering the street:

Secondary Research: What would I like to find out more about to further develop my solution?

- *What types of flood defence systems currently exist?*
- *What ideas could I take from existing solutions to use in my flood defence solution?*

Reflection Point: What am I being asked to do?

_____

_____

_____

For support on research and design, you can access ‘My Design Guide’ here

Informed by your research, communicate:

Concepts for flood defence systems you feel might suit Sráid Oide. (*You may use additional pages for sketches, if necessary)*

Control system(s) to operate the flood defence system(s). You may use additional pages if necessary to communicate elements of your design.

Prototype your chosen flood defence system

This may be done using a physical model, a card/paper model, or a resource such as the control prototyping kit. These will support you in refining your thoughts when developing your solution

Chosen Solution: *Having considered and evaluated the potential solutions you outlined, communicate your chosen solution in detail.*

Choose the components needed to operate your system. Test these in so far as practical on your model.

_____

_____

_____

_____

On reflection, have I created a solution that meets the needs of this project/brief? If so how?
If not, why?

_____

_____

_____

Oide
Tacú leis an bhFoghlaim Ghairmiúil i measc Ceannairí Scoile agus Múinteoirí
Supporting the Professional Learning of School Leaders and Teachers

Student Context

- 2nd Year Engineering, term two/three

Prior Learning:

Design tasks, mechanism and motion types, communication of research, manufacturing skills, assembly skills. Basic circuit design and construction.

Focus of Learning:

- Modelmaking and Prototyping
- Design communication & research skills
- Justification of design decisions
- Application of a mechatronics in a real-world context

Chosen Learning Outcomes:

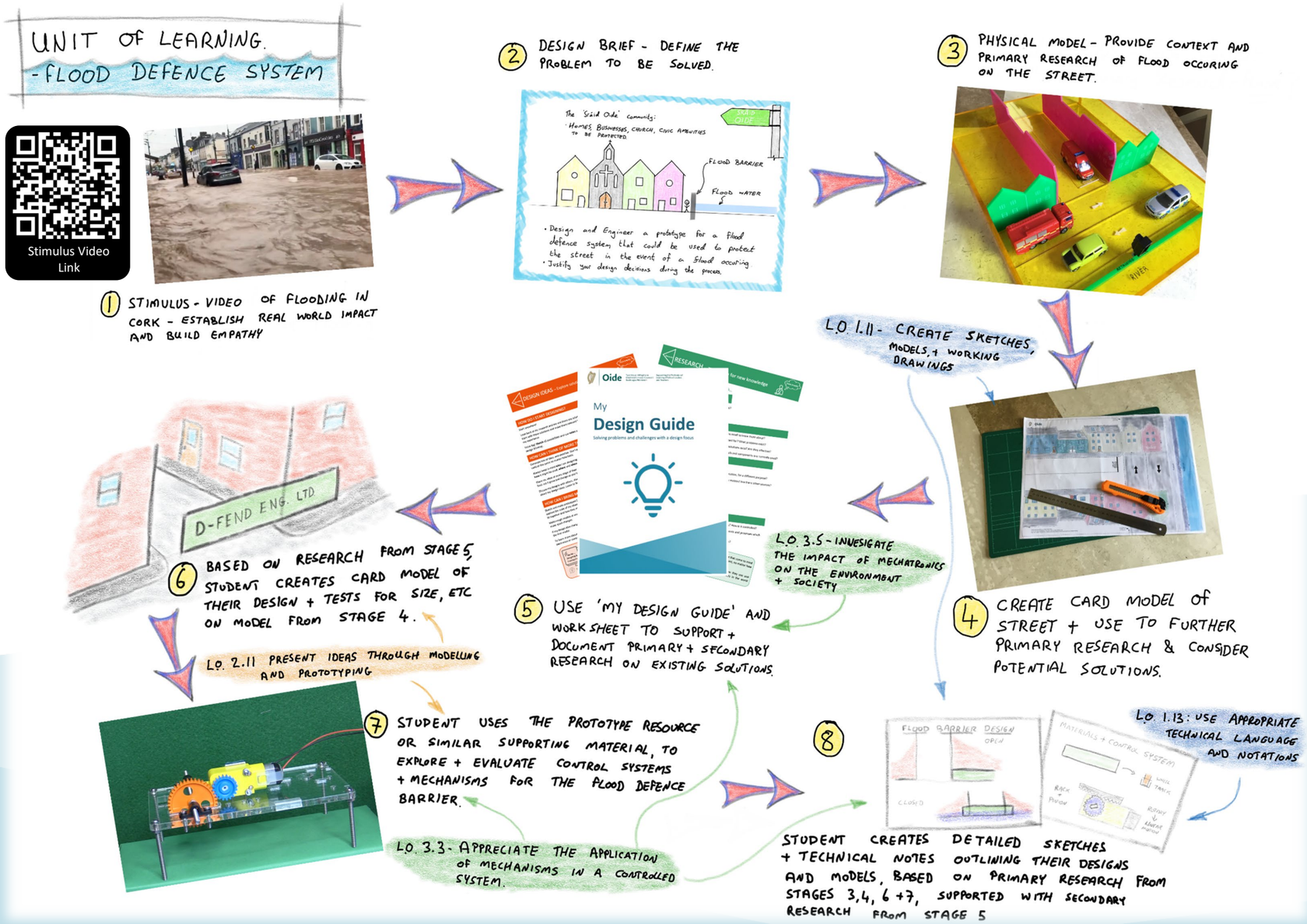
1.11 **create** sketches, models and working drawings
1.13 use appropriate technical language and notations
2.11 **present** ideas through modelling and prototyping, using appropriate media
3.3 **appreciate** the application of mechanisms in a controlled system
3.5 **investigate** the impact of mechatronics on the environment and society

Key Learning:

Using action verbs to support your thinking.

- Explore initial solution using the card cut out model
- Investigate existing solutions and identify useful information
- Model suitable chosen solution using card cutout model
- Identify a suitable mechanism to power the chosen solution using the control prototyping kit
- Justify and present your chosen solution

Communicate a practical learning experience to activate key learning:



What resources would be needed?

Card Model of the 'Sráid Oide'. Control Prototype resource, nut drives, screw drivers, resource sheets, sketching equipment and media to use to communicate and justify design choices. Reflection sheets to document their learning.

How could the key learning be assessed?

- Design ideas for the flood defence system
- Communication of research conducted and identification of relevant information
- Selection of suitable mechanism
- Construction of mechanism to solve the design task using control prototyping resource
- Justification of the design choices made, supported by prototyping of solution and sketches that define their solution

Oide

DISCARD CUTS TO THE LEFT OF THIS LINE

CUT

CUT

CUT

FOLD

FOLD

CUT

UP THE REBELS!

CUT

STOP

Footpath

FOLD

CUT

Existing River Walk Wall

RIVER LEE

FOLD

CUT

CUT

CUT

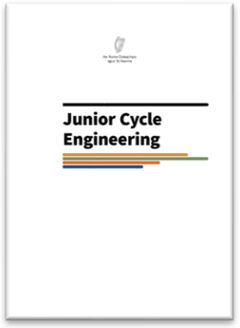
CUT

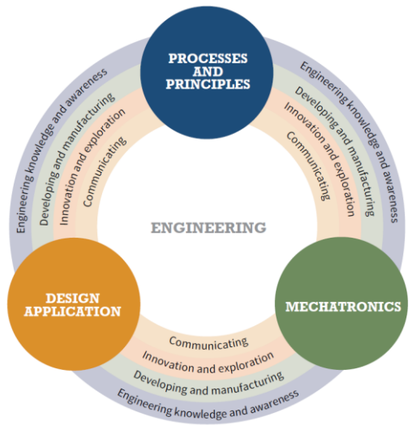
Follow the instructions to create Sráid Oide.
Cut on the long dashed lines, then fold on the shorter dashed lines.
Use your model of Sráid Oide to help consider the design problems and guide your design thinking.

DISCARD CUTS TO THE LEFT OF THIS LINE

Oide
Tacú leis an bhFoghlaim Ghairmiúil i measc Ceannairí Scoile agus Múinteoirí
Supporting the Professional Learning of School Leaders and Teachers

Junior Cycle Engineering – Learning Outcomes





Apply: select and use information and/or knowledge and understanding to explain a given situation or real circumstances

Appreciate: recognise the meaning of, have a practical understanding of

Build: construct by putting parts or material together

Choose: pick out as being the best or most appropriate of two or more alternatives

Configure: arrange or put together in a particular form or configuration

Communicate: use visual, gestural, verbal or other signs to share meaning or exchange information; interaction between sender and recipient; both work together to understand

Create: process and give form to the topic that is to be created using selected methods and material and/or to give the material used a new form

Demonstrate: prove or make clear by reasoning or evidence, illustrating with examples or practical application

Design: planning the features of a solution that solves a perceived user problem

Develop: advance a piece of work or an idea from an initial state to a more advanced state

Engage: enter into or become occupied by an activity or interest; to attract or hold interest and attention

Engineer: develop/build an item for a specific purpose that includes critical-to function components

Evaluate: collect and examine evidence to make judgements and appraisals; describe how evidence supports or does not support a judgement; identify the limitations of evidence in conclusions; make judgements about the ideas, solutions or methods

	Strand 1: Processes and principles In this strand, students employ the fundamental processes and principles of engineering by applying their knowledge of materials and processes to manufacture and design products. Students develop an engineering mindset as they appreciate that accuracy and precision, together with the use of established engineering principles and processes lead to the production of innovative and efficient solutions of high quality and finish.	Strand 2: Design application In this strand, as they develop an engineering mindset, students learn about the key stages of the engineering design and manufacture process. They learn about the importance of design for both the end-user experience and the economic and social impact of the product. They discover how the combination of informed choice of materials and correct processes produces a solution that is functional and efficient. Students come to appreciate the value of good project management and learn how to manage themselves and the process of product development from design to manufacture.	Strand 3: Mechatronics In this strand, students may work with a combination of mechanical, manufacturing, electronic and computing systems and software to explore relationships between simple inputs, processes and outputs. They will learn about systems, and how they can be coordinated to ensure the desired output. Students develop the mindset to appreciate how control systems operate on a larger scale, and how the design of control systems can impact on the environment and sustainability. They appreciate the role that engineers have in employing 'systems thinking' to design products and services that contribute to a better future.
	Students should be able to:	*Students should be able to:*	*Students should be able to:*
Engineering knowledge and awareness The learning outcomes in this element are designed to raise student awareness and develop knowledge of relevant engineering principles and developments. Students will learn how to use the materials and equipment available to them in Engineering to inform their decisions about material and resource selection to engineer a product or solution.	1.1 **understand** the concepts and approaches that are required when solving an engineering problem 1.2 **demonstrate** a range of manufacturing processes 1.3 **recognise** and adhere to health and safety standards 1.4 **understand** the properties associated with a range of engineered materials	2.1 **understand** the key stages of the engineering design process 2.2 **evaluate** the factors that influence design 2.3 **choose** a suitable material to **engineer** a product	3.1 **explain** the operation of basic mechatronic systems 3.2 **investigate** relationships between inputs, processes and outputs for basic control systems 3.3 **appreciate** the application of mechanisms in a controlled system
Innovation and exploration In this element, the learning outcomes encourage students to explore the applications of engineering in the world around them. Students research existing and emerging developments and gain an appreciation of their impact and potential application to an engineered product.	1.5 **research** applications of existing and emerging technological developments 1.6 **engage** with the various engineering disciplines by relating them to everyday application	2.4 **explore** how design impacts on the function and quality of a product including ergonomic considerations 2.5 **apply** appropriate engineering concepts and approaches in the execution of their design solutions 2.6 **use** relevant information to enhance design and function	3.4 **explore** the application of systems in an engineering setting such as the classroom, home and industry 3.5 **investigate** the impact of mechatronics on the environment and society 3.6 **configure** and **program** basic mechatronic systems using appropriate software 3.7 **design** a basic mechatronic system either individually or collaboratively
Developing and manufacturing In this element, the learning outcomes develop the student's abilities to produce products and solutions through various materials. Students combine their learning from other elements to engineer products to a high, functional standard. The key focus is on efficiency, accuracy, precision and high-quality finish.	1.7 **develop** engineered solutions to various challenges 1.8 **identify** appropriate tools and equipment specific to a task 1.9 **apply** suitable manufacturing processes to **engineer** a product 1.10 **demonstrate** high-quality work, to include accuracy and surface finish	2.7 **apply** their knowledge of the properties associated with a range of engineering materials 2.8 **manufacture** a product from a working drawing 2.9 **modify** an existing product/design 2.10 **incorporate** basic project management techniques	3.8 **build** and **test** a basic mechatronic system with specific inputs or outputs 3.9 **incorporate** basic mechatronics into their engineered products
Communicating Throughout this element, the learning outcomes encourage students to communicate, through appropriate media, to relay technical information, design ideas and the impact engineering has on the environment around them.	1.11 **create** sketches, models and working drawings 1.12 **interpret** working drawings 1.13 **use** appropriate technical language and notations	2.11 **present** ideas through modelling and prototyping, using appropriate media 2.12 **communicate** their design decisions using suitable media	3.10 **represent** key information using appropriate media 3.11 **justify** their choice of the most appropriate system or systems for a specified purpose

Explain: give a detailed account including reasons or causes

Explore: to think or talk about something in order to find out more about it

Identify: recognise patterns, facts, or details; provide an answer from a number of possibilities; recognise and state briefly a distinguishing fact or feature

Incorporate: take in or contain something as part of a whole

Interpret: use knowledge and understanding to recognise trends and draw conclusions from given information

Investigate: observe, study, or make a detailed and systematic examination, to establish facts and reach new conclusions

Justify: give valid reasons or evidence to support an answer or conclusion

Manufacture: something made from raw materials by hand or by machinery

Modify: to alter one or more particulars of an object/product

Present: make objects perceivable for others

Program: to instruct a device or system to operate in a particular way or at a particular time

Recognise: identify facts, characteristics or concepts that are critical (relevant/ appropriate) to the understanding of a situation, event, process or phenomenon

Represent: bringing clearly and distinctly to mind by use of description or imagination

Research: the study of materials and sources in order to establish facts and reach new conclusions; revision of accepted theories or laws in the light of new facts

Test: establish the quality, performance, or reliability of something

Understand: have and apply a well-organised body of knowledge

Use: apply knowledge or rules to put theory into practice; employ something in a targeted way

Scan or click on the QR code to access the Junior Cycle Engineering specification at curriculumonline.ie

Consider and record the **knowledge**, **understanding**, **values** and **skills** for the learning outcomes

Learning Outcome: _____ Action Verb: _____

Knowledge
Understanding
Skills
Values

Learning Outcome: _____ Action Verb: _____

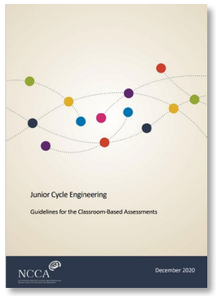
Knowledge
Understanding
Skills
Values

Communicating My Learning

Choose an appropriate way to communicate the key information and stages of the task you have undertaken in class.
(Fill the boxes as necessary, you do not need to fill them all)

Success Criteria/Reflections:

Engineering CBAs



NCCA Assessment Guidelines

There are two Classroom-Based Assessments in Engineering. They are assessed at a common level. The Classroom-Based Assessments for Engineering are:
CBA 1: Engineering in action
CBA 2: Research and development
This poster is a reference chart for the Features of Quality used to determine grade descriptors for CBA one and CBA two, as outlined in the December 2020 version of the Assessment Guidelines' document from the NCCA. Teachers should use an 'on balance' judgement to assign a grade descriptor to a CBA.
Full details of the CBA process are available in the 'Assessment Guidelines' document from the NCCA, which can be accessed via the QR code to the left.

The student's response to their Classroom-Based Assessment can be produced in any format that is appropriate for capturing their reflection. For example:

- In written form, such as a report
- In digital form, such as a blog, a video or slide presentation
- In visual form, such as a graphic presentation or a display
- In audio form, such as a podcast or a voice-over

This list is not intended to be exhaustive but serves to offer suggestions as to the possible choices in presenting the Classroom-Based Assessment.

GRADE DESCRIPTORS

	CBA 1 – Engineering in action (Undertaken in year two, during a max. of three weeks)				CBA 2 – Research and development (Undertaken in year three, during a max. of three weeks)		
	Research & Analysis	Engineering Principles	Evaluating their CBA	Communicating their CBA	Research & Analysis	Exploring Concepts	Communicating their Work
Exceptional A piece of work that reflects these Features to a very high standard. While not necessarily perfect, the strengths of the work far outstrip its flaws, which are minor. Suggestions for improvement are easily addressable by the student.	The research method chosen demonstrated a comparison of a range of sources which led to the production of a comprehensive and detailed analysis of the data/findings.	The response demonstrates a comprehensive awareness of relevant engineering principles for their chosen area of learning.	Critical evaluation of the response was evident throughout the task that lead to refinements at various stages resulting in meaningful, accurate conclusions and examples of real-life applications.	The presentation of the response is of an excellent standard, using highly effective media which allowed for a critical consideration of what information accurately communicates the task.	The research method chosen demonstrated a comparison of a range of sources which led to the production of a comprehensive and detailed analysis of the data/findings.	The response demonstrated a comprehensive understanding of a range of concepts in relation to the theme.	The presentation of the findings is of an excellent standard; using highly effective media which allowed for a critical consideration of what information best communicates their response.
Above Expectations A piece of work that reflects these Features very well. The student shows a clear understanding of how to complete each area of the task. Feedback might point to the necessity to address some aspect of the work in need of further attention or polishing, but, on the whole the work is of a high standard.	The research method chosen was effective for their area of learning and generated an in-depth level of analysis.	The response demonstrates very good awareness of relevant engineering principles for their chosen area of learning.	The evaluation of the response is at a high level, with relevant and accurate conclusions that indicates an understanding of reallife applications.	The response is presented to a very high standard, using effective media, with careful consideration of what information bests communicates the task.	The research method chosen was effective for the theme and generated an in-depth level of analysis of the data/findings.	The response demonstrated a high level of understanding of concepts relevant to the theme.	The findings are presented to a very high standard, using effective media, with careful consideration of what information accurately communicates their response.
In line with Expectations A piece of work that reflects most of these Features well. It shows a good understanding of the task in hand and is free from significant error. Feedback might point to areas needing further attention or correction, but the work is generally competent and accurate.	The research method chosen was appropriate for their area of learning and generated a suitable analysis.	The response demonstrated some awareness of relevant engineering principles for their chosen area of learning.	The evaluation was appropriate; conclusions are brief and include some suggestions on real life applications.	The response is well presented, using appropriate media, with careful consideration of what information to communicate to best showcase the task.	The research method chosen was appropriate for their area of learning and generated a suitable analysis.	The response demonstrated some level of understanding of concepts relevant to the theme.	The findings are well presented, using appropriate media, with careful consideration of what information to communicate their response.
Yet to meet expectations A piece of work that falls someway short of the demands of the Classroom-Based Assessment and its associated Features. Perhaps the student has made a good attempt, but the task has not been grasped clearly or is marred by significant lapses. Feedback will draw attention to fundamental errors that need to be addressed.	The research method chosen for their area of learning was ineffective and the analysis lacks depth.	The response demonstrated little or no awareness of relevant engineering principles for their chosen area of learning.	The evaluation of the response offers little or no conclusions and makes no suggestions on real life applications.	The response is presented in an unsuitable format resulting in an ineffective communication of the Classroom-Based Assessment.	The research method chosen for the theme was ineffective and the analysis of the data/findings lacks depth.	The response demonstrated little or no understanding of concepts relevant to the theme.	The findings are presented in an unsuitable format resulting in an ineffective communication of their response.

Teaching & Learning Improvement Plan

Department Name: _____

Date from: _____
Date to: _____

Focus of Improvement Plan: Identify an area of learning and teaching for improvement.

Improvement Plan: Outline the strategies / learning experiences you plan to use.

Outcomes: What change would you like to see at the end of the improvement period?

Evaluation of impact and next steps:

Seirbhís Tacaíochta de chuid na Roinne Oideachais
A Department of Education Schools' Support Service

Oifig an Stiúrthóra Bainistíochta, BOOLM, Sráid an tSéipéil, Dún Dealgan, A91 C7D8.
Managing Director's Office, LMETB, Chapel Street, Dundalk, A91 C7D8.

Oide
Tacú leis an bhFoghlaim Ghairmiúil i measc Ceannairí Scoile agus Múinteoirí
Supporting the Professional Learning of School Leaders and Teachers