Assessment of Scientific Literacy in the Scottish Curriculum for Excellence

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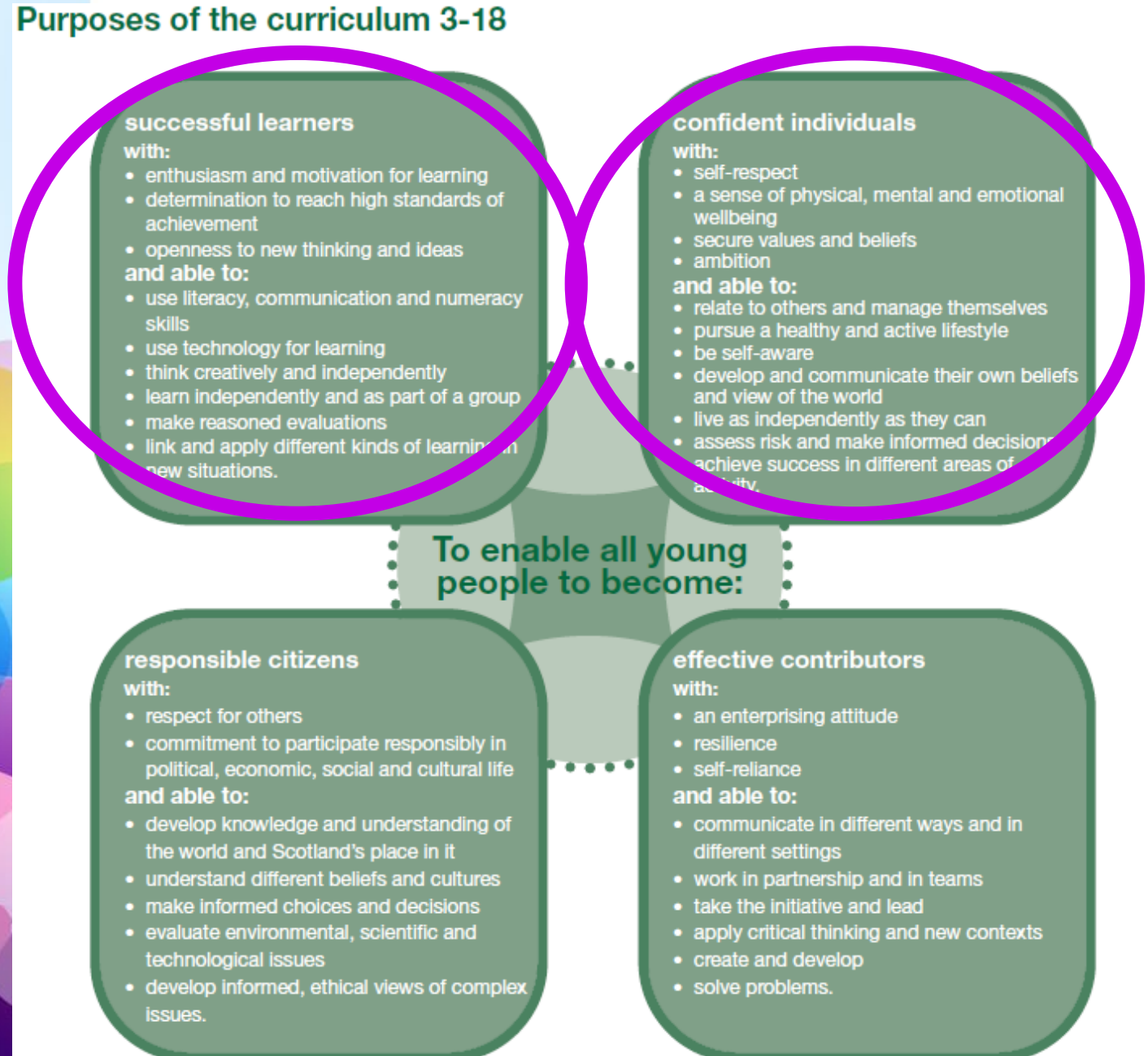
Outline

I. Scottish *Curriculum for Excellence*
II. The National 5 Assignment
III. Implementation of the National 5 Assignment in East Renfrewshire Council
IV. PISA 2015 - Scientific literacy
V. Research aims
VI. Collaboration between DCU and East Renfrewshire Council
VII. Motivation for taking part in this research
VIII. Overview of our experience and next steps

Outline of the Scottish *Curriculum for Excellence*



The National 5 Assignment

The assessment has been designed to assess the following:

- applying knowledge of biology to new situations and interpreting information;
- selecting and presenting information appropriately in a variety of forms;
- processing the information/data collected;
- drawing valid conclusions and giving explanations supported by evidence/justification, and
- communicating findings/information.

The assignment offers challenge by requiring skills, knowledge and understanding to be applied in a context that is one or more of the following:

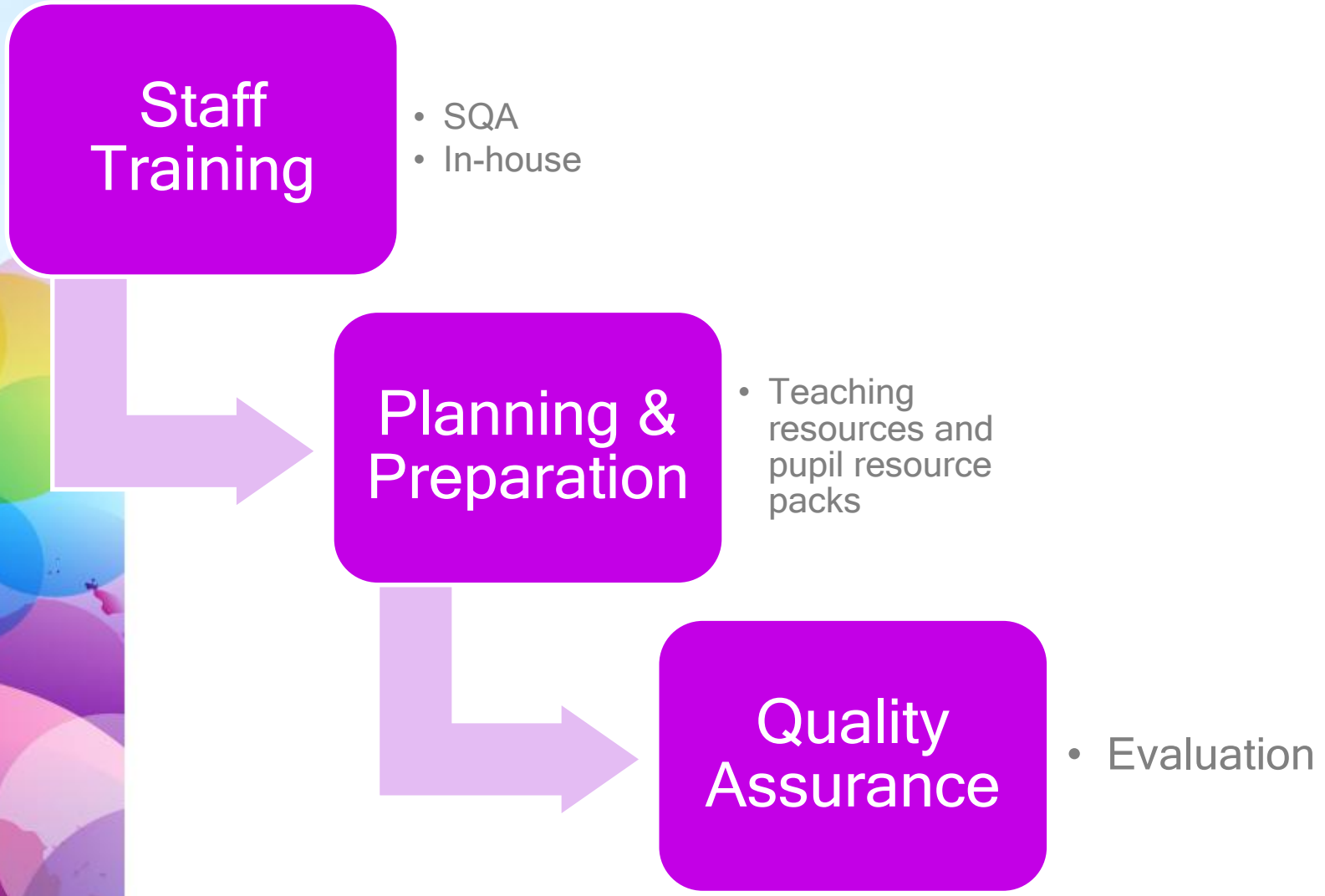
- unfamiliar
- familiar but investigated in greater depth
- integrates a number of familiar contexts

Introduction of the National 5 Assignment

Candidates are expected to:

- choose, with support, a relevant topic in biology that has an effect on the environment and/or society
- devise an appropriate aim
- describe the relevant application(s) of biology and explain the effect on the environment/society
- research the topic by selecting, processing and presenting relevant data/information
- draw a conclusion
- describe underpinning biology knowledge and understanding and explain its relevance to the topic researched
- communicate the findings of the research in a report

Implementation of this Assessment



PISA 2015 - Scientific Literacy

Scientific Literacy is the ability to engage with **science-related issues**, and with the **ideas of science**, as a **reflective citizen**.

A scientifically literate person, therefore, is **willing to engage** in reasoned **discourse** about **science** and **technology**...

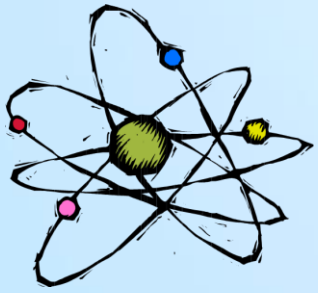
OECD 2013

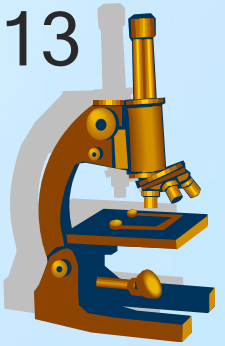
PISA 2015 - Scientific Literacy

... which requires the competencies to:

1. Explain phenomena scientifically
2. Evaluate and design scientific enquiry
3. Interpret data and evidence scientifically

OECD 2013





1. Explain phenomena scientifically

A. Recall and apply appropriate **scientific knowledge**;

B. Identify, use and generate explanatory **models** and **representations**;

C. Make and justify appropriate **predictions**;

D. Offer **explanatory hypotheses**;

E. Explain the potential implications of scientific knowledge for **society**.

OECD 2013

2. Evaluate and design scientific enquiry

A. **Identify the question** explored in a given scientific study;

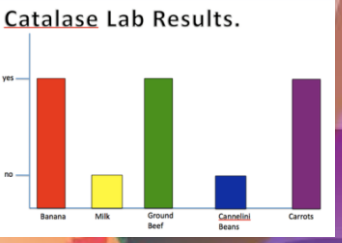
B. **Distinguish questions** that are possible to investigate scientifically;

C. **Propose** a way of exploring a given question scientifically;

D. **Evaluate** ways of exploring a given question scientifically;

E. **Describe** and **evaluate** a range of ways that scientists use to ensure the **reliability** of data and the **objectivity** and **generalisability** of explanations.

OECD 2013



3. Interpret data and evidence scientifically

A. **Transform data** from one representation to another;

B. **Analyse** and **interpret data** and draw appropriate **conclusions**;

C. Identify the assumptions, evidence and reasoning in **science-related texts**;

D. **Distinguish between arguments** which are based on scientific evidence and theory and those based on other considerations;

E. **Evaluate** scientific arguments and evidence from **different sources (e.g. newspaper, internet, journals)**.

OECD 2013

Scientific Literacy & Socio-scientific research

- Student-led socio-scientific research tasks can be used to develop and assess many of the competencies associated with scientific literacy.
- The benefits of such tasks are...
  - They provide real life contexts.
  - They can be personalised by the student to suit their own interests.
  - Topics tend to be more contemporary and can focus on cutting edge science, increasing student interest.

Zeidler & Nichols 2009

Study Aims

- Present a case study of the implementation of the National 5 Biology Assignment, a student-led SSI assessment.
- Investigate the development and assessment of scientific literacy through student-led, socio-scientific research assessment.
- Document student and teacher experiences of carrying out the National 5 Assignment and examine these experiences in the context of the PISA framework for scientific literacy.

Partnership Timeline

- **June 2015** – initial meeting to establish the foundations of the partnership and to identify the case study:

The Case Study

Participants

Six teachers and their classes took part in the case study.

Methodology

Examination of teacher lesson reflections
Examination of student lesson evaluations
Interviews with five participating teachers

Partnership Timeline

- **October 2015** – the assignment process took place in school.
- **November 2015** – teacher and pupil reflections were gathered based on the assignment process, focus groups were held and questionnaires were completed.
- **May 2016** – Ruth interviewed teachers and the lesson and focus group recordings and teacher and pupil reflections were submitted to Ruth.
- **June 2016** – presenting the success of this partnership at SMEC

Our Motivation for Taking Part in this Research Partnership

- Support professional enquiry and reflection as part of our career long professional learning.
- To secure a sustainable a learning partner.
- Sharing good practice and taking pride in our work.
- To supplement our own quality assurance programme for the assignment process within our school.
- Help to ensure that teachers have a clear and consistent view of the outcomes for the assessment and safeguard equality and inclusion.

Overview of our Experience and Implications

Further Research

- Thematic analysis of teacher and student reflections
- Continue the case study with the 2016/17 cohort of students
- Recruit other subject teachers (physics and chemistry) for 2016/17