Looking forward: A critical analysis of literacy, numeracy and digital competence as cross-curricular responsibilities in the evolving curriculum in Wales.

Raising attainment and achievement in literacy and numeracy across schools in Wales has become a key aspect of focus in the current and emerging curriculum. As a result of Wales' underperformance in the 'PISA' tests in 2012, achieving below the OECD average in reading, science and mathematics, Estyn have recommended raising effectiveness in planning, teaching and assessment (Estyn 2012-2013). Similarly, in the same year, the Welsh Government's Minister for Education and Skills, Leighton Andrews, proposed a review of ICT in schools due to its 'light' involvement in the curriculum. Andrews wrote a statement discussing the importance for learners to develop skills for a socially changing and digitalised economy. Therefore, the *2013 ICT Steering group* looked at policies and gathered information from all stakeholders to devise recommendations. A key recommendation was the implementation of 'digital skills' in a statutory framework that would 'sit alongside' the Literacy and Numeracy Framework (Arthur et al., 2013).

Currently, the Literacy and Numeracy framework is statutory from Foundation Phase to Key Stage 4 and taught alongside other subject areas in order to "develop them effectively" and raise standards (Welsh Government, 2014, p. 10). Through this, and the recent development of the Digital Competence Framework, Donaldson (2015) is informed of their importance as 'cross-curricular responsibilities', hence it is a proposal in *Successful Futures*. In order to gain a good understanding of the implications of the cross-curricular responsibilities in Wales' 'evolving curriculum', its application, effectiveness and challenges will be explored in this discussion.

Barnes (2015) investigates the purpose of learning for children, perhaps questioning the idea of its extrinsic motivation, which is essentially producing a future workforce, and instead encouraging an intrinsic purpose for learning. This opportunity can be manifested through cross-curricular learning, as he suggests that "The world beyond the classroom is cross-curricular" (Driscoll et al., 2015 p. 260), therefore it should be embedded in children's learning to foster meaningful and real-world experiences (Hayes, 2010).

Barnes (2015) and other constructivists connect their thinking in terms of how they perceive the concept of cross-curricular learning. In order to apply knowledge and skills to day to day tasks and work, children would need to collaborate in environments that offer the integration of subject disciplines, as opposed to teaching subjects separately, as the chances of acquiring 'interdisciplinary' skills reduces (Hayes, 2010). However, Fogarty (1995, cited in Hayes, 2010) insists the term 'cross-curricular learning' is still ambiguous for many professionals as there is not an agreed definition for its meaning. Fogarty suggests that this could depend upon its effectiveness within a school. Hayes (2010 p. 382) includes definitions such as Jacobs' (1989), where the combination of various subjects is taught through "…a central theme, issue, problem, process, topic or experience."

The reviews of the National Curriculum (2013, cited in Barnes, 2015) in the UK resulted in the Government turning to the *Cambridge Primary Review* (supported by Robin Alexander), who adopted an idea of incorporating a 'community curricula' for the 2014 National Curriculum. This aimed to balance 'disciplinary skills and cross-curricular themes' and focused on inclusivity amongst children from deprived areas. Similarly, Donaldson's (2015) seven areas of learning correspond with this curriculum that includes eight areas. Although, citizenship was 'omitted' from this curriculum, Donaldson (2015) favours creativity and the purpose of being "ethical, informed citizens…" which are attributes for cross-curricular learning. Additionally, the curriculum in Australia and British Columbia involve 'citizenship' as a cross-curricular responsibility. Despite this initiative made by the UK Government, primary schools are still encouraged to frame their own educational approach (Barnes, 2015). Moreover, Donaldson maintains literacy, numeracy and digital competence to be cross-curricular responsibilities, encompassing the skills framework in the 2008 National Curriculum (Welsh Government, 2013).

According to Barnes (2015), English is the subject that can be applied in every 'topic or thematic work'. Literacy covers oracy, reading and writing, and their expectations aim to develop children's ability to apply these skills appropriately across the curriculum (Welsh Government, 2013). Donaldson (2015) states that in order to be competent in literacy, learners should possess the certain levels of 'spoken word, syntax and spelling'. *The World Literacy Foundation* (2015, cited in Castles et al., 2018 p. 5) found that, those who lacked competence in literacy were more likely to acquire health problems, commit crimes and acquire welfare dependency, resulting in "substantial additional, social and economic costs." Gross (2013) identifies the significance of communication. Didau (2014) recognises that one in six people in the UK struggle with literacy. To function in society, good standards of communication must be learned, likewise in school through cross-curricular learning. Gross continues to discuss how children should be exposed to the appropriate language from a young age e.g. through parents reading to their children, as Feinstein and Duckworth (2006) concluded that the age in which indicates a child's attainment at the end of their education, is 5 years old. If reading at home with an adult is inaccessible, Ofsted (cited in Didau, 2014) offers an alternative. They recommend for schools to encourage an 'enjoyment of reading' by creating a positive image of libraries and through cross-curricular links. They found links in performing arts in secondary schools. For example, reading scripts.

Furthermore, Martin et al. (2007) stresses the importance for schools to teach for creativity as much as possible, instead of teaching for SATs for half of the year. For this to happen, Barnes et al. (1989) and Ferreiro (2000, cited in Martin et al., 2007) suggests giving children more opportunities to 'talk' in the classroom, and for teachers to embedd context into children's learning so that they can make connections, acquiring deeper understanding and knowledge. For the first year of professional teaching practice, an indication of cross-curricular links was planned for an activity, however the execution was questionable as well as the 'strong' links. The thematic approach (Barnes, 2015) was used, and for the nursery class the theme was 'snow'. The story that the class explored was *One Snowy Night*. One activity involved recalling ingredients to make cookies for Percy and writing a shopping list. The main objective of the activity was for the children to practice their writing and become aware of the layout of a shopping list. Understanding that the story was used as a hook, most children did not seem to engage in the task as some grew bored of writing, hence, it is uncertain whether

there were strong links and understanding between the writing element and the theme. Perhaps Barnes would not consider this as a 'powerful' experience. However, when a 'Morfo' of Percy was created on the iPad asking children to help him learn facts about the animals, the children seemed motivated to help Percy, therefore they engaged well with this task. From there, the children used the KWL grid, where they were able to talk and share ideas. Perhaps, the use of the animated Morfo of Percy could be used to sustain children's interest in the first activity. For example, Percy could ask them questions about the ingredients and what cookies they are going to make to encourage talk. Hayes (2010) points out that there are subject disciplines that connect 'more naturally' than others, and this may be the case for oracy linking to most subjects. Moreover, *Philosophy for Children* (P4C) can be used to promote dialogue, develop listening, questioning and reflection, with support of evidence of 10-12-year olds from Clackmannanshire gaining higher levels of self-esteem, behaviour and cognition. This method can also be used in subjects like Religious Studies or areas such as Personal and Social Development, Well-being and Cultural Diversity where deep questions can be explored (Gross, 2013).

Those who do not possess substantial levels of numeracy are at risk of unemployment especially with the rise of the technology era (Askew, 2012). The Welsh Government (2013) states that numeracy is how an individual applies their mathematical understanding in different environments such as school, home or work. They suggest that it needs to be cross-curricular in primary and secondary schools. Additionally, numeracy skills within the four strands can be drawn from other areas of the curriculum, for instance: 'map reading, tracking progress in physical education and using perspective in visual arts.' Grigg (2015) argues that children should perceive mathematics as a form of communication and a way of understanding the world around them, especially when it comes to the world of work. *Mathematical literacy* would be the term to consider when recognising this as it also involves mathematical reasoning (Estyn 2012-2013). Higgins, Baumfield and d (2001, cited in Cremin and Burnett, 2018) mention the 'odd one out' teaching method and how it encourages creative thinking and reasoning in different subject disciplines. For example, children can explain why they think the shape is the odd one out (out of the three) as a mathematical activity. Similarly, research suggests, according to Askew et al. (1997, cited in Grigg, 2015), that valuing the child's way of thinking and how they make connections (aspect of the Knowledge Quartet) can strengthen their progress.

According to Barnes (2015), numeracy and subjects such as history can be combined to understand the 'wider world'. An example from professional teaching practice of transferring skills and knowledge within history and mathematics could challenge this idea. Children from a lower ability year 3 and 4 were looking at World War 2 as their theme. They took part in activities that involved measuring and weighing food in preparation for their V-E Day party. One of the activities was to make chocolate 'rice krispy' cakes for the party. This practical experience did excite the children especially those with behavioural difficulties. The children weighed the chocolate and rice krispies with eagerness and most of them could recall the unit of measurement. Also, there was dialogue occurring, though more questions could have been asked to clarify the children's understanding. Although this activity provided children with a meaningful experience, the children did not have the opportunity to learn any specific skills within the Key Stage 2 History programme of study, as well as in the other activities. Perhaps Barnes' (2015) single-transferable approach is demonstrated here, as opposed to a theme-

based approach. Askew (2012) would argue that learning mathematical concepts without an interesting hook would 'disengage' the learner, and instead suggests giving children a 'narrative scenario.' On the other hand, Barnes (2015) would suggest that sometimes it is appropriate to withdraw the theme and teach subject 'specific skills' and knowledge.

Pound and Lee (2011) discuss how mathematics can be linked to literacy and ICT as they are forms of communication. They highlight that the 'conventional' structure of mathematics is changing in the demanding age of technology. Bearne and Wolstencraft (2007, cited in Pound and Lee, 2011, p. 88) convey that children can be taught different forms of writing using software that allow for 'importing and manipulating text.' This can be developed using mathematical skills in data handling. Pound and Lee give the example of children gathering data from their each other and creating a 'digital presentation' of the data in graphs. Furthermore, encouraging dialogue through P4C in mathematics is beneficial according to Daniel (1999, cited in Pound and Lee, 2011) as it gives children the opportunity to question and clarify their mathematical understanding. Referring to the research project conducted in Clackmannanshire, Scotland (2007), showing evidence that this type of dialogue in the primary classroom increased children's cognitive abilities 'after six months of enquiry', which then developed their confidence with enquiry in secondary school (Pound and Lee, 2011). Similarly, in the same year Nunes and Bryant found the significance of 'logical reasoning' in mathematics as they found an increase in attainment, especially for those who found the subject difficult (Education Endowment Foundation, 2015), and Philosophy for children considers this concept.

The Welsh Government (2016) ague that digital competence and ICT are somewhat different in that digital competence involves the development of 'skills, knowledge and attitudes' that children of all abilities can meaningfully apply to different contexts and 'scenarios', which ultimately results in digitally competent individuals in society. Donaldson (2015) includes the 'Routes to Learning' aspect of the digital competence framework which help leaners with additional needs, by providing 'individualised' progression steps. He adds how digital skills should be used 'creatively'. Being placed in schools that have relatively high percentages of pupils with FSM, technology devices were scarce, hence the opportunity for all children to gain *equal* experience of using their digital skills creatively were limited. It was also difficult to plan for creativity. However, the Welsh Government (2016) have recommended that it is the school's responsibility to liaise with the local authority or regional consortia to provide access to 'valuable' resources to support learning 'across the curriculum', especially with the continuous advancement of technology. Savage and Barnett (2015) would support the idea of 'digital literacy' being a 'continuum' as children would have to adapt the skills and knowledge learned, into new contexts. Whilst the demand of digitally literate individuals is increasing, it is also important to consider the "…norms of appropriate, responsible behaviour with regard to technology use" also known as 'digital citizenship' (Ribble, 2014, cited in Savage and Barnett, 2015, p. 107). Although only a few 'in-depth' studies have been conducted, Grohol (1999, cited in UNICEF, 2017) found that the effect of too much online use included the neglect of 'family, friendships and social activities'. There are other aspects that are influenced, such as mental and physical health. ERW (2018-2019, p. 68) on the other hand, have stated that 'effective support' will be provided for teachers and learners in order to implement the "relevant strands and elements of the Digital Competency Framework across the curriculum." Furthermore, Park (2016) suggests that, success in this area would need to

include assessment and feedback tools in guiding children to identify and reflect on their strengths and weaknesses. Cremin and Burnett (2018) also emphasise the benefits of this and recommend Welsh Government documentation that demonstrates the use of the *Reflection Triangle* which is to 'support metacognition', allowing children to evaluate the way they learn (Welsh Government, 2010).

Estyn (2015) reports good practice of cross-curricular learning in Haberdasher's Monmouth School for Girls, where they are encouraged to take ownership of their learning through developing resilience, good study habits, learning 'how their brain and memory works, and conducting their own investigations. However, this cannot occur unless the correct environment is provided for the children. This can be the influence of educational stakeholders and teachers' subject knowledge. Two aspects can be considered. The first one is teachers' content knowledge. Barnes (2015) identifies that a 'small-scale' study in America demonstrated the lack of encouragement teachers provided in 'exploring mathematical ideas', as their own 'confidence and knowledge' in that subject was weak. Nevertheless, (Feuerborn et al., 2009, cited in Barnes, 2015, p 168) found that "two 5-day summer classes… bought immediate gains" for these teachers. Barnes continues to discuss how important this is as it can lead to the avoidance of addressing children's misconceptions. One way for teachers to develop their pedagogy is through collaboration. Roy (2016) proposes the idea of organising staff year group meetings to discuss the topics that have been taught as well as sharing teaching techniques. Also, Welsh Government (2013) suggests the implementation of 'whole school systems' to support cross-curricular assessment of literacy and numeracy, which results in teacher and parent/carer collaboration. Additionally, schools should assign a member of staff who would lead each cross-curricular responsibility of numeracy, literacy and digital competency (Donaldson, 2015).

Tim et al. (2012) may see that collaboration is 'only way' to access cross-curricular learning, but Grigg (2015) would argue that instilling attitudes of self-awareness for an individual can 'fill gaps' in their knowledge and behaviour, it can lead to 'rash decision making' about the way they interact with people and the world. American Psychologists, Joseph Luft and Harry Ingham call this 'Johari'. On the other hand, Beane (1995, p. 620) asserts that teachers must first be 'generalists on integration' or in other words their confident in cross-curricular methods, and "secondarily on content specialists", as relevant contexts in approaches provides motivation and clearer understanding for children.

Overall, cross-curricular learning is holistic and aims to help learners be proficient in 'collaboration and problem-solving' (Roberts, 2018) so that they are confident in facing different challenges in life that concern work, family, community and the environment, and these are themes that teachers can 'draw' from to create learning experiences (Beane, 1995). Roy (2016) articulates that "You do not need a teacher to learn facts, but you do need a teacher to develop the skills to use those facts."

Wordcount: 2,742

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Student Self Evaluation Form

This section repeats in brief the common assessment criteria detailed on previous pages. The *extent* to which these are demonstrated by you determines your mark. Using these criteria, tick the box that best indicates the level of achievement you feel you have achieved with regard to each of them.

Common Assessment Criteria Applied	Level of Achievement						
	REFER		3rd	2:2	2:1	1st	1st
	OUTRIGHT FAIL	UNSATISFACTORY	SATISFACTORY	GOOD	VERY GOOD	EXCELLENT	EXCEPTIONAL
1. Subject Knowledge and Understanding (which includes using research-informed literature and knowledge and understanding of the subject)	0-29%	30-39%	**40-49%**	**50-59%**	**60-69%**	**70-79%**	**80-100%**
	☐	☐	☐	☐	☐	☒	☐
2. Intellectual Skills (Analysis)	0-29%	30-39%	**40-49%**	**50-59%**	**60-69%**	**70-79%**	**80-100%**
	☐	☐	☐	☐	☐	☒	☐
3. Pedagogic and Professional Applications (Practical Application and Deployment)	0-29%	30-39%	**40-49%**	**50-59%**	**60-69%**	**70-79%**	**80-100%**
	☐	☐	☐	☐	☒	☐	☐
4. Key Transferable Skills	0-29%	30-39%	**40-49%**	**50-59%**	**60-69%**	**70-79%**	**80-100%**
	☐	☐	☐	☐	☒	☐	☐

PLEASE COMMENT ON AREAS IN WHICH YOU FEEL THAT YOU HAVE PERFORMED WELL	PLEASE COMMENT ON AREAS YOU FEEL THAT YOU NEED TO DEVELOP
- Synthesising information. - Including evidence. - Using own experience to discuss ideas.	- Apply more examples of cross-curricular learning models to the cross-curricular responsibilities. - Be more concise. - Explore more government recommendations.

Student's Name	**Jovine Barrientos**	**Date**	**13/12/18**
Student's Signature			