

A critical analysis of the relationship between teacher subject knowledge and effective learning and teaching in the primary school

In this essay, I aim to discuss the relationship between teacher subject knowledge and effective teaching and learning in the primary school. Alongside this, I will be reflecting on my experiences on my Professional Teaching Experience (PTE) to evaluate and analyse my own subject knowledge for primary teaching, looking at Language, Literacy and Communication, Mathematics and Numeracy and Digital Competence. The identity of the school, the staff and students will all be confidential and anonymous in line with the British Educational Research Association (BERA) guidelines. Thus, the school will be referred to as School X.

School X is an English medium primary school which caters for 424 pupils between the ages of 3-11. The school has a considerably low percentage of pupils entitled to free school schools at 10%, in comparison to the all-Wales average of around 19%. The school has identified that around 11% of pupils have additional needs, which again is below the national average (21%). No pupils speak Welsh at home and a few pupils speak English as an additional language.

(ESTYN, 2018).

Whilst on PTE, I was placed in a Year 1 class with 24 pupils (12 boys, 12 girls). The class teacher was supported by a teaching assistant. No children in the class had a statement of special educational needs.

Shulman (1986)

The first major study on the importance of teacher knowledge was carried out by Lee Shulman in 1986 and has since had great influence on teachers' subject knowledge and research surrounding effective teaching. A particular interest of Shulman's work was directed towards the content specific characteristics of teachers and the knowledge bases required in teacher education. Within his research, Shulman (1986) categorised teacher knowledge into seven categories which underlie the understanding of effective teaching:

1. Content knowledge
2. General pedagogical knowledge
3. Curriculum knowledge
4. Pedagogical content knowledge
5. Knowledge of their learners and their characteristics
6. Knowledge of educational contexts
7. Knowledge of educational ends

Shulman (1987, p.8)

Ball *et al* (2008) acknowledge that the first three categories identify content-specific aspects of teacher knowledge. These are arguably, the most influential categories with interest been directed towards pedagogical content knowledge (PCK) (Jones and Moreland, 2015). The latter address general features of the required teacher knowledge which are considered important but not the main focus of Shulman's work. Content knowledge (CK) is referred to by Kleickmann *et al* (2013, p.91) as '*teachers' understanding of the subject matter taught*'. Whereas, defining PCK is deemed more complex as highlighted by Ball *et al.*, (2008) who address the lack of no agreed definition of what constitutes PCK as it is valued differently across subject areas. Shulman's conception of PCK was referred to as:

"the ways of representing and formulating the subject matter that makes it comprehensible to others" (Shulman, 1986, p. 9).

Relationship between subject knowledge and effective learning

Since Shulman's (1986) publications, research on teachers' subject knowledge has led to assumptions that this forms the basis of teachers' professional competence (Hoy, Tarter and Woolfolk Hoy, 2006). In more recent research, teachers' subject knowledge is held in high regard as it is this that is central to student learning (Evens *et al.*, 2015).

According to Kunter *et al.*, (2013), the quality of teachers' subject knowledge is paramount to effective teaching and learning as it benefits students' outcomes. Similarly, Toh *et al.*, (2006) value the importance of the quality of teaching students receive, arguing that it plays a significant role in student learning and achievements.

The United Nations Convention on the Rights of the Child (UNCRC) acknowledges education as one of the rights that all children are entitled to – Article 28.

Furthermore, they also recognise the quality of education received is important (UNCRC, 1989).

If teachers have broad subject knowledge, they will be able to present content meaningfully to students and be confident with sharing their expertise to maximise students' learning (Dalton and Tharp, 2002). Likewise, recognition of the importance for key subject knowledge is highlighted by Ko and Sammons (2014) as an essential prerequisite for effective teaching.

Baumert *et al.*, (2010) addresses the most effective teachers are those who have deep knowledge of the subjects they teach. Consequently, it is claimed that if teachers' subject knowledge is inadequate then this causes a barrier to students' learning (McGrane and Lofthouse, 2010). Similarly, to Shulman, Eraut (2002) acknowledges the need for teachers to have a deep understanding of the varied types of knowledge bases to become effective teachers. Primary school teachers are required to have the ability to teach across all year groups, without key knowledge and understanding of subjects or content, they are putting those students at a disadvantage.

Further studies have shown that it is knowledge specific to teaching that facilitates effective teaching. Hill *et al* (2005) investigated the importance of PCK in mathematics and found that students had better understanding and made more progress when teachers had effective knowledge for teaching. Furthermore, the study revealed that students' learning had progressed significantly because of the knowledge teachers had in mathematics.

In addition, good subject knowledge is also found to have a positive effect on how the curriculum is implemented by teachers. The importance of this is also addressed in the *Qualified for Life* document by the Welsh Government (2014) which highlights the need for excellent teaching and learning across Wales. Huw Lewis, former Minister for Education and Skills in Wales highlighted that excellent teaching and learning is developed by;

“...motivated, committed, excellent practitioners, who are highly skilled, who combine expert subject knowledge with a deep understanding of the learning process and who continually seek to improve their skills”.

(Welsh Government, 2014, p. 12).

Highly successful teachers are those who have broad knowledge and understanding across all areas of learning and can successfully transfer their knowledge to students.

Contributing factors for effective teaching and learning

In contrast, there are those who consider that effective teaching involves more than predominantly good subject knowledge. Blömeke and Delaney (2012) suggests a model that considers two main components of teachers' professional competence - cognitive *abilities* and *affective-motivational characteristics* to become an expert teacher.



Figure 1 [Blömeke and Delaney, 2012]

As evident in Figure 1, it is a combination of aspects that teachers should consider within their teaching profession. Having said this, Guerriero (no date) makes note of how some models do not consider both the general cognitive abilities and affective characteristics.

Furthermore, it is argued that to be effective teachers, they must not only have good understanding of the content, they must be able to effectively communicate this to their students. It is those who can adapt and transform their knowledge to make accessible for *all* students to understand, through instructional tasks, the activities in which are used to develop the understanding and how they represent this knowledge (Verloop, Van Driel and Meijer, 2001; Deng, 2017).

In correspondence to this, the OECD report by Guerriero (no date) highlights that as well as good subject knowledge, having the ability to adapt their teaching style to accommodate differentiated needs of students, having effective problem-solving strategies and better decision-making skills are acknowledged within the report as contributing factors that will lead to effective teaching.

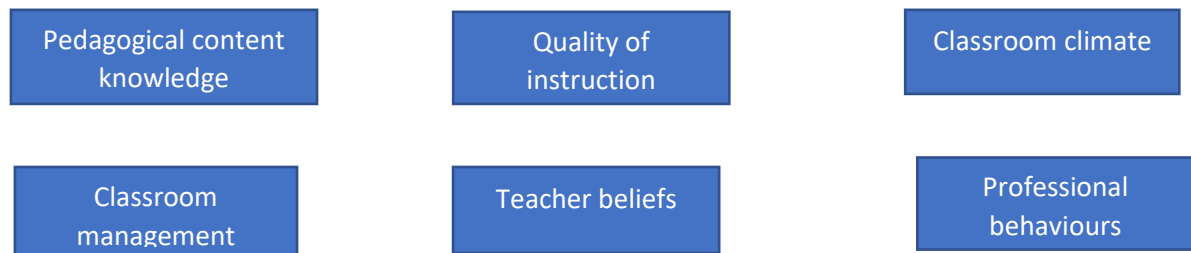
It is argued that for effective learning to occur in classrooms, teachers have a responsibility to assess students' learning to consider their understanding of learning. Assessment for learning is key for the teaching-learning process as it is used to provide feedback to teachers as a guide to inform understanding of students learning (Department for Children, Education, Lifelong Learning and Skills, 2010). This is a key component of teachers' PCK and their role in checking for understanding or misunderstanding (Shulman, 1987).

Jones and Moreland (2015) also argue that effective teaching is not always because of having good subject knowledge. They consider feedback that teachers provide to students is vital for effective teaching as it assists students to make progress in the area of learning that they have found difficult. For students to take their learning further, teachers have a responsibility of providing feedback to students in a way in which they understand, especially to tackle any misconceptions about what is being taught (Black and William, 1998; Seidel and Shavelson (2007). Having said this, if teachers lack substantial knowledge in the subject taught then teachers will struggle to address any misconceptions that students have as they too will not have the ability to provide information and knowledge about the content.

The way in which teacher quality is measured has been controversial over the years with many questioning how teachers' subject knowledge can be assessed to provide successful teaching and learning opportunities. Turner-Bisset (2001) raises this concern and argues that there is no consensus as to what forms the basis of

effective teaching and what knowledge teachers need to provide the best learning experiences for their students.

However, Coe *et al* (2014) conducted a review on '*What makes great teaching?*' and notes that research surrounding effective teaching suggests there are six components that are used as a tool to measure the quality of teaching for teachers to go by:



(Coe *et al* (2014, p. 2-3).

Coe *et al* (2014) argue how relying on pedagogical content knowledge is not enough if we want to provide students with the best opportunities for learning and a successful future. Furthermore, they believe that teachers who demonstrate all of these in their teaching are considered as effective teachers.

Even though the importance of PCK in relation to effective teaching and learning is acknowledged, Appleton (2003) points out that most of the research on PCK has been undertaken at secondary school level, in different subject areas. This can leave primary school teachers question what is needed within their own profession.

Measuring teacher quality is complicated however important for providing support for teachers to develop their skills and knowledge within education. It is only in recent years that frameworks have been developed to assess components of effective teaching. Similar to the work of Coe *et al* (2014), Goe, Bell and Little (2008) identify seven elements that can be used to evaluate teacher quality:

1. Classroom observations
2. Value-added' models
3. Student ratings
4. Principal (or headteacher) judgement

5. Teacher self-reports
6. Analysis of classroom artefacts
7. Teacher portfolios

The most common tool used to assess teacher quality seen in schools is classroom observations. They are used as a formative assessment of teaching to enhance teaching quality and effectiveness (Andersson and Palm, 2017). Teachers will be observed in their own practice to assess what is happening in their classroom and what effective teaching is being taught. These observations should result in meaningful feedback for teachers to consider. As student teachers, it is required that we are observed in our own practice to see how we are progressing against the teaching standards.

In relation to research developed to assess components of teacher knowledge, most of the research lies in the domain of mathematics (Hill *et al.*, 2005, Krauss *et al.*, 2008; Schmidt *et al.*, 2007; Tatto and Senk, 2011). Walshaw's (2012) article expresses the view that limited knowledge relevant to the lesson may lead to students unable to grasp the relevant mathematical concepts. Alongside this, it is noted by Walshaw how teachers who lack enough knowledge in mathematics, may rely on examples of mathematical concepts that could prevent students' learning and understanding.

Mewborn (2001) argues that there is often a lack of confidence and ability to explain the concept and procedures of what they are teaching, especially in mathematics. If teachers are not able to explain the concepts of division for example, this leads to a lack of understanding by students, confidence in their ability and motivation to learn (Harlen, 1999).

The issue surrounding poor subject knowledge has also been addressed by Delaney *et al.*, (2008) who suggested that to be an effective teacher, they must know 'how' to teach mathematics. The term *mathematical knowledge for teaching* (MKT) was developed as a result of analysing the fundamental knowledge required to teach mathematics.

A study carried out by Kersting *et al* (2012) focused on how to measure MKT. The study looked at using classroom video analysis in classrooms to measure teachers' ability to apply their mathematical knowledge through quality instruction. Those with

good subject knowledge are more likely to be able to deliver instructions to students in a way that makes sense to them (Goe, Bell and Little, 2008). Similarly, Kersting *et al* (2012) argue that students will have more opportunities to learn if the content is delivered through high quality instruction. However, they do acknowledge how this approach is only one way of measuring mathematical knowledge of teachers.

Analysis and evaluation of my subject knowledge for primary teaching

To reflect on my teaching practice, I am going to use Shulman's (1986) seven categories of knowledge base as mentioned previously in the literature.

Content knowledge

Content knowledge involves knowledge that teachers need and use throughout teaching for their students to develop the skills, dispositions and knowledge needed (Grossman, Wilson, & Shulman, 1989). Teachers must understand what children need to learn to become successful learners. In literacy for example, the need for children to understand phonics, spelling, grammar, punctuation and comprehension and so on is relied upon teachers' knowledge to successfully demonstrate how these are used as tools for learning.

An area in which I need to develop my knowledge and understanding in, is phonics. I had the opportunity to deliver a Read, Write, Inc. lesson with a small group of children during my PTE which was the first lesson of the day. I had previously observed how my class mentor led these sessions and make notes on the approach she used to deliver the session. I used my notes as well as researching phonic lessons to plan my own lesson to deliver (see appendix 1 for lesson plan). I was happy with the lesson I had planned as I thought it would gain the children's interests with it involving a game of bingo as well as developing their knowledge of set 2 phonics. However, when challenging the children on the set 2 sounds, some had difficulty recognising the sounds on the cards. I went through the flash cards with the children to correct any misconceptions the children had on the words. However, I need to develop my subject knowledge for teaching phonics to clearly explain concepts such as identifying which grapheme represents the same phoneme in different words, in a way that children will understand. I also need to make sure I

pronounce the graphemes clearly and correctly to make sure children can blend them together correctly.

General pedagogical knowledge

General pedagogical knowledge (GPK) is defined as:

“those broad principles and strategies of classroom management and organizations that appear to transcend subject matter”

(Shulman, 1987, p. 8)

As discussed beforehand, teaching requires more than subject knowledge. How teachers motivate their students, use educational resources, plan lessons and consider their delivery and instruction of the lesson all contribute to effective teaching (Voss, Kunter and Baumert, 2011).

Having experienced working in a school environment previously, I felt quite confident with my classroom management. I believe this helped me to adapt to my role as a student teacher as my confidence developed over time, something which was highlighted by my class mentor. Also important during my PTE was knowing how to gain attention of the class when needed as well as dealing with disruptions, something which Good and Brophy (2007) refer to as elements of general pedagogical knowledge.

Vaudroz, Berger and Girardet (2015) would argue that this knowledge is likely to be developed during teaching practice over time which is something I strongly agree with. I felt I was able to observe how my class teacher approached classroom management whilst on my PTE and found I was able to put my own approach to how I managed the class when I was teaching.

General pedagogical knowledge also consists of the teaching styles and methods we use to adapt learning to student's needs. There are many different methods that as teachers we could use that can involve teacher and learners, or methods that would suit a more learner-centred approach:

- Cooperative learning
- Experiential learning
- Technology

- Demonstrations
- Class discussions
- Real life scenarios
- Direct teaching

This is not an exhaustive list, but it shows that there are many methods that teachers can consider when teaching (Wahl, 2017).

Curriculum knowledge

My experience on PTE1 made clear how important it is to have clear understanding for teaching in the developing curriculum in Wales. The new curriculum will see three cross-curricula responsibilities that include literacy, numeracy and digital competency (Donaldson, 2015). Out of the three cross-curricula responsibilities, I consider digital competency to be my weakness in relation to knowledge and how to develop digital skills across areas of learning and experience.

However, my PTE gave me the opportunity to develop my skills and understanding of digital competency. As part of the QTS standards S2: Knowledge and Understanding, the use of ICT to enhance learning and teaching is acknowledged. This was a standard that my tutor and I discussed during my end of week review, with a target developed to incorporate and use ICT within activities for children. Building up my knowledge on the subject, especially the DCF, was crucial before I could implement the lesson and in a way that was understood by children (Verloop, Van Driel and Meijer, 2001; Deng, 2017). The DCF document supported my planning to see what skills I could address and develop within my lesson.

Pedagogical content knowledge

Pedagogical content knowledge was discussed previously in relation to what it entails and how it contributes to effective teaching. As mentioned previously, PCK involves more than good subject knowledge, it also covers teachers' knowledge of pedagogy and ability to make the content accessible for all students. As a student teacher, it is important that I know different strategies and ways of representing, modelling and explaining knowledge for students to understand specific content.

To make the learning more engaging, I tried to think of different strategies that would help students understand the concept of addition and subtraction for example. With

some children, the need to make my lessons hands-on was important as they were able to visualise the concept. I used my knowledge of the concrete, pictorial and abstract approach of teaching maths to help develop understanding. Alongside planning for approaches and strategies to use, I also had to consider assessment for learning (AFL) strategies to check their understanding. I tried to change the AFL strategies that I used with the children

Knowledge of learners and their characteristics

It is important that as a teacher I recognise the needs of all learners (Banks *et al*, 2005). This requires me to have a deep understanding of their abilities, if they require additional support as well as gaining understanding of interests (Holt, 2009). This was an important part of my PTE1 for me to plan effectively for my class. Therefore, during my observation week, I made observational notes on individual children capturing all the above that were addressed by Holt (Bruce, Louis and McCall, 2015). I had to think of ways that I could deliver a lesson to children in ways in which they would understand the content delivered. Differentiation within my planning was key as is acknowledged by Dunn (2017) as;

“Making each lesson as accessible as possible to every child in your class” (Dunn, 2017, p. 65).

Knowledge of learners is considered an essential component in Shulman’s (1986) model for knowledge base. For me to address this, I referred to the Foundation Phase Framework (2015) to help with my planning, considering the skills for Reception, Year 1 and Year 2 to fulfil my students’ abilities (see appendix 2). Having said this, I did find some difficulty during my mathematics lesson on shapes. I differentiated my planning for my ability groups in Maths, however when working with my high ability group I did not explain some key terms in ways *all* children were able to understand. I made notes to reflect on this matter for my assisted reflective conclusions (ARC) of the lesson.

Knowledge of educational contexts

It was important for me to take into consideration the contextual factors that could affect my teaching performance. Prior to teaching the class, I was informed by my class mentor of how the children were grouped for mathematics and language,

literacy and communication. The groupings for mathematics was based on the children's abilities, however for all other areas of learning the children were put in Kagan cooperative learning groups which were of mixed ability. Another important role I take to consider whilst on my PTE was the ability to plan and communicate effectively with support staff. For the learning objective to be achieved, I needed to make sure that

Knowledge of educational ends, purposes and values, and their philosophical and historical grounds.

As teachers, our goal is for all the children we teach to succeed in their education. The developing curriculum in Wales has four purposes in which we hope children and young people develop as;

- *Ambitious, capable learners, ready to learn throughout their lives*
- *Enterprising, creative contributors, ready to play a full part in life and work*
- *Ethical, informed citizens of Wales and around the world*
- *Health, confident individuals, ready to lead fulfilling lives as valued members of society*

(Donaldson, 2015, p. 29).

Teachers have a role of ensuring they are providing opportunities in learning for children to be all these things. It is crucial that now, as I am entering the teaching profession as changes are taking place, I am developing the skills and knowledge needed to become an outstanding teacher.

Within education, there are many different theories behind teaching and learning such as constructivism, behaviourism and humanism. At the centre of all these philosophies is providing learning opportunities through effective teaching. The Foundation Phase curriculum is considered as a child-centred philosophy as it places emphasis on hands-on learning. To provide these experiences for children, knowledge on how this can be done effectively is key. I found during my PTE, I was struggling to provide opportunities for the children to develop skills whilst on enhanced activities. Lack of concentration or interest was something that I observed during the enhanced activities, which resulted in me having to think of things on the spot that children would be engaged with. I feel that this is an area that I will need to

develop during my teaching practice to provide the best learning opportunities to all children.

In relation to short-term goals of lessons, teachers seek to achieve effective and outstanding lessons in every lesson that they teach. As a professional, it is important to take the time to reflect on my practice and consider ways forward to improve my teaching.

Conclusion

The relationship between teachers' subject knowledge and effective teaching and learning remains a contentious topic within education. A central contribution to this assignment was to consider the research by Shulman (1986) and the characteristics of teacher's knowledge bases that were recommended. Much of the research was in support of the work by Shulman who perceived content specific aspects of teacher knowledge as fundamental to great teaching and learning of students. Also evident within the literature was how teachers who have deep knowledge and understanding are confident in explaining concepts and delivering these with high quality instructions which enables students to make sense of their learning (Goe, Bell and Little, 2008; Kersting *et al*, 2012). I believe this is an area which I need to develop during my teaching practice, to confidently convey knowledge and understanding to the class. It must not be ignored the fact there are contributing factors that teachers need to acknowledge within their practice such as assessment for learning, feedback and teaching styles to provide the best learning opportunities and outcomes for children. Within my practice, I have tried to address these factors whilst in *school X*. Overall, I believe that for effective learning and teaching to take place in the primary school, teachers must acknowledge all the factors discussed within this essay. Education continues to change and develop as seen here in Wales, therefore it is only right that as professionals we continue to reflect, develop and share good practice.

Appendices

Appendix 1 – Read, Write, Inc. lesson plan

Name of Trainee: Parsons ref. _____		Date: 27/11/18		Class: Year 1		Cynllun Ffocws y Cyfnod Sylfaen	
Targed(au) Hyfforddi Personol _____		Number of learners: _____		Age: 5/6/7		2d	
Learning objectives/intentions:		To recognise sounds in practical activities		Success Criteria		Main activities	
Introduction/planary tasks		Trainee focused task		Resources/ Key Vocabulary		Assessment for Learning (strategies and opportunities)	
Introduction (10-15 minutes) Group on carpet Revisit set 2 sounds using flash cards Use MTYT to model sounds and assess children's phonic knowledge Children in pairs to practise reading the green words to each other, then swap over		Introduce phonics bingo to group. Write different set 2 sounds on the whiteboard and ask the children to call them out as we go along. 'igh, air, ee, oo, ow, ou, oo, ir, ay, ov, sh, ch, th, ng. Children to use whiteboards and create 6 boxes on whiteboard – model this for children Children will choose 6 digraphs and write one in each of the boxes Explain to the children if I call out a sound and the children have that same sound on their board then they can cross it off. The first one to cross off all sounds will win 2 Dojo points		Resources Phonics flash cards Fred Key Vocabulary Igh Air Ee Oo Ow Ou Oo Ir Ay Oy Sh Ch Th Ng		Observe children during MTYT Checking children's understanding of set 2 phonics during practical activity.	
Planary		Mix up set 1 and set 2 sounds and ask children to say the sound when the card appears					

Appendix 2 – Differentiation in my planning,

Name of Trainee: <u>Lauren Parsons</u> Session ref: <u>27.11.18(1,2)</u> Date: <u>27/11/2018</u> Class: <u>Year 1</u>					Cynllun Ffocws y Cyfnod Sylfaen 2d
Targed(au) Hyfforddi Personol: <u>To use incidental Welsh</u> Number of learners: <u>25</u> Age: <u>5/6</u>					
Learning objectives/intentions:	<u>To recognise 2D and 3D shapes</u>	Success Criteria Squares - I can identify 2D and 3D shapes I can talk about the properties of different shapes Triangles - I can name 2D and 3D shapes I can correctly sort 2D and 3D shapes	Meeting learners' needs:	Differentiated activities for the different abilities. Squares – Year 2 subject skill Triangle – Year 1 subject skill	
Introduction/plenary tasks		Main activities		Assessment for Learning (strategies and opportunities)	
Introduction (10-15 minutes) Whole class on carpet area Explain the LO for today – We are going to be learning about different shapes that are 2D and 3D shapes. Ask children if they can give an example of a 2D shape, then 3D shape– ask how they know it is 2D or 3D Draw/write these on the whiteboard Introduce PowerPoint with the children to play guess the shape Explain independent learning opportunities (challenge board activities) as well as LSA activity.		<u>Trainee focused task</u> Squares - To recognise 2D and 3D shapes and simple properties. Children will identify each shape and will see if it is a 2D or 3D shape. Discuss with the children what they notice about the shape. Look at properties of 2D shapes in order to fill in table. Triangles - To name and sort familiar 2D and 3D shapes. Children will sort images under the correct headings in their books (2D and 3D). Children to label what shape it is. <u>Additional adult tasks</u> Shape hunt: Children will work in their groups to go out of the classroom on a shape hunt. Children to use shape hunt recording sheet to		<u>Key Vocabulary</u> Square Rectangle Triangle Circle Semi-Circle Cube Cuboid Sphere Cone Sides Straight Curved 2D 3D <u>Resources</u> 2D shapes 3D shapes Potato Card for pizza toppings Bee-Bot and mat Polydron Tally chart worksheet	
				Questioning 'Who has a...?' game during plenary to check children's understanding Question children about what they found on the shape hunt – ask for volunteers to give examples	

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