

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

For the purpose of this essay I am going to start by concentrating on the much-debated relationship between learning and teaching in primary school and teacher subject knowledge. I intend to concentrate on the literature surrounding the importance of Teacher Subject knowledge in the primary school and look at this in relation to my own experience on my first Professional Teaching Experience. I will, however, keep the name of the school and any names mentioned throughout anonymous, therefore any names that are mentioned will have been changed in accordance with BERA guidelines. My teaching practice school has a student population of around 500 pupils between the ages of 3 and 11. There are 23 different languages within the school and it is 91% EAL. 32% of the children are from a disadvantaged area. I was placed in a Year 3 class with 30 students (2 of which are learning full time within an unofficial Learning Resource Base within the school grounds). There are no full time or part time support staff in the class room.

A review of literature

Teachers have many roles in a child's life, but a significant one is to scaffold and guide children's learning, develop their knowledge and enable them to gain deep understanding of a subject. This is, however, only possible if a teacher's subject knowledge is strong. Teacher subject knowledge is an area of education that always sparks conversation, particularly at the moment in Wales when you take into consideration the introduction of Graham Donaldson's Successful Futures (that is set to be released in April 2019) and the impact that it is going to inevitably have upon the way in which teachers, teach. However, it is not a new area of debate.

Lee S Shulman (1987) discusses the belief that there exists a "knowledge base for learning" which highlights the basis that knowledge, skill, understanding and technology as well as representing and communicating are vital parts of teaching. The Carnegie Task Force (1986) follow the aforementioned belief and carry on to claim that knowledge base is growing. In their opinion, as well as Shulmans, knowledge should directly frame teaching education and therefore directly inform teaching practice. To have an effective knowledge base, Shulman argues that a teacher should apply results of recent research into teacher effectiveness to their own skill set, letting this directly inform how they teach and what they teach. To an extent, they argue that teaching requires basic skills, content knowledge (CK), and pedagogical content knowledge (PCK). Both of these types of knowledge have been found to affect teachers' instructional practice as well as the students learning and improvement within multiple subjects.

Content knowledge and pedagogical content knowledge are 2 key components of teacher subject knowledge that can affect a student's progress in education (Kleickmann, 2012). Content knowledge represents teachers understanding of the subject matter that is being taught. Shulman (1986) states that the teacher needs to not only understand that something is so, they also need to understand the ins and outs of *why* something is so. Kleickmann extends this by saying that the emphasis of content knowledge is to have a deep understanding of the subject matter that is being taught.

Furthering this, pedagogical content knowledge can be seen as an extension of content knowledge in that it is the knowledge that is needed to make the subject matter accessible to students (Shulman, 1986). There are two main facets of this: knowing the students' subject specific conceptions and misconceptions and knowledge of specific teaching strategies. Many people consider the fact that both of these things (CK and PCK) work in tangent meaning that having an in-depth content knowledge is a prerequisite of pedagogical content knowledge. However as in most things, teaching is what you make of it. Having a strong content knowledge does not necessarily lead to the development of pedagogical content knowledge and it is important to consider the notion that the view of teaching influences a teachers overall effectiveness (Lee, et al 2007).

There are circumstances within the profession where having a strong pedagogical content knowledge is of more use than just having an in-depth content knowledge. For example, if you have an Additional Learning Needs (ALN) or English as Additional Language (EAL) student in your class. Having a strong pedagogical knowledge is going to allow you to cater specifically to the needs of these learners, allowing them to gain more success with their learning. Similarly, children who are found to be lower achieving benefit mainly from teachers who are especially competent in terms of their pedagogical content knowledge (Baumert et al 2010) as these teachers in particular are able to hone in on specific techniques and teaching strategies that are suitable for the needs of the learner. In relation to this, Murray (2018) states how many countries are focusing on the different types of knowledge needed to support effective teaching. Specifically, in relation to Mathematics, she says that this focus moves beyond just mathematics content, and that teachers need to know about the art of teaching in order to teach effectively.

However, the main emphasis of Kleickmann, Richter et als paper is how important teacher knowledge actually is, and that in relation to this, teacher education should be seen and regarded as a key target for educational reform. There is mention as a part of Graham Donaldson's Successful Futures (2015) of teachers and school leaders needing training particularly in new or heightened importance areas such as Welsh Language, Health and Well-being, Digital Competence and Computer Science as well as curriculum planning and assessment, however, what about the main core subjects that will still be embedded within the new

curriculum? Unver, (2018) uses the example of the KQ to understand and support teacher training, again highlighting the importance of both CK and PCK.

In Coe's (2014) opinion the most effective teachers have deep knowledge of all of the subjects that they teach. He states that "when teachers' knowledge falls below a certain level it is a significant impediment to students' learning". Which highlights Shulmans argument into content knowledge being vital to pupil progress. Coe continues in saying that as well as having a strong understanding of what is being taught, teachers also need to understand the ways students think about the content, be able to evaluate the thinking behind students' own methods and identify students' common misconceptions which is in idea also highlighted by Shulman (1986).

The knowledge quartet (Rowland 2008) is a framework for the identification and discussion of primary teacher's content knowledge as shown in their teaching within the classroom. It is essentially linked with mathematics however has the validity to asses content knowledge in multiple aspects of the curriculum. It was developed as a way to identify the ways in which trainee's mathematics content knowledge assimilated in their teaching. They based their focus around subject matter knowledge and pedagogical content knowledge which lead them to multiple categories of which were used to classify different areas. It is believed to be a useful tool for thinking about the way in which subject knowledge is used in the classroom. The Knowledge Quartet, as the title suggests, is split into 4 categories.

The first section is called Foundation. This consists of understanding how children learn and the different ways in which they can be taught. Within this strand a practitioner should be able to identify pupil errors and rectify them in an effective way. The seconds category, Transformation, is in relation to being able to model, demonstrate or explain work in way that learners are able to understand – this may mean using multiple representations. Connection, the third category, is about making connections between different concepts, ideas and processes. It is mainly about being able to build upon learners' prior knowledge and to then be able to access this prior knowledge/learning to develop and to make connections with their future learning. Contingency is the final section. Within this, you are required to respond to leaners ideas, questions and difficulties. You cannot plan for this section as you cannot know what your learners may ask, no matter how well you may know them. This section also consists of exploiting opportunities that arise within your lessons in order to maximise learning. You should also be able to offer alternative explanations and tasks if that is what is needed by the learner.

In contrast, John Hattie (2012) takes a vastly different approach upon teacher subject knowledge. He by no means is arguing that content knowledge and pedagogical content knowledge does not play a vital role upon a teacher's standard of teaching, but he argues that there are aspects of teaching that have can have much

greater impact upon a learner's outcomes. He states that as teachers, we invent multiple reasons to explain why students cannot learn and that the underlying premise of most of the things we come up with are that educators cannot change students. However, Hattie believes that as educators, that is exactly what we should be doing through our teaching. He highlights that teachers' beliefs and commitments are the greatest influence on student achievement that we can have some modicum of control over. And that we do this by being what he refers to as "expert teachers" and "inspired teachers". He cites Steele (2009) to state that these types of teachers are convinced that they are responsible for student learning and consistently strive to do a better job every day. Russel Bishop, (2003) created effective intervention's for learning in mainstream classrooms and considers – similar to Hattie - the beliefs of teachers to be integral to teaching and learning. He argued that teachers have very strong theories about their students and are often reluctant to accept evidence that shows that their students do not conform to the theories that they have created, going on to highlight that student and teacher beliefs are often vastly different.

The main pieces of literature that have been observed during this work displayed differing opinions. However, the legitimacy of one, did not undermine the validity of the other. What they have both done in differing ways is highlighted that the relationship between teacher subject knowledge and effective learning and teaching in the primary school is about more than just what you know. Having good content knowledge also requires you to know how to represent a subject in a way that will be beneficial for all of your learners, how to make connections within different areas of learning, how to react and respond to learners, and finally, how to anticipate the needs of your learners. I have come to understand that CK and PCK work hand in hand but how teachers teach and apply pedagogy is just as important (and sometimes more so) than having extensive content knowledge.

Experience

Within this placement, I have found a great importance in teacher subject knowledge, particularly with the start of the introduction of Graham Donaldson's Successful Futures. Through the use of the holistic curriculum, you are now teaching multiple Area's of Learning (AoLE) in one session, rather than concentrating on that one main subject area. During multiple one-hour long Topic sessions that I taught, I was including elements of Mathematics, Digital Competency, Literacy, Science and Technology and Creativity. Without having at least mediocre knowledge of each area, the lesson would have been meaningless for the learners. I would have been able to teach it, but would the children have gained anything of real value from it?

Literacy for me, is an area of learning that I enjoy and have always felt was my stronger area, which is why through discussion with my mentor and myself during my teaching practice, I chose it as my first area to

teach. However, my particular teaching practice school was not like other schools that I had previously worked for. The ratio of English as Additional Language and New to English students was significantly higher than that of the children who were born in Wales. I had originally assumed that this would just mean explaining tasks in more detail, providing extra resources/stimulus and allowing more thinking time.

However, whilst teaching my first full Literacy lesson, the disparity between the learners in my class became extremely evident. I mistakenly took the children's prior knowledge for granted, which meant that I was not prepared to answer the questions that the children were asking. The main question, that I was most unprepared for was simply, "What is a squirrel?". Whilst planning for my lesson, I had not taken into consideration that I would need to be able to describe what a squirrel was. I had fully revised shape poems, metaphors, similes and all of the other aspects included within the learning objective and success criteria, but the learner prior knowledge of the subject matter was something that I had overlooked.

The task had asked the children to work as a group to write a couple of lines to contribute to a whole class poem, but how could these children write this poem, if I as their teacher had not provided them with the appropriate knowledge to do so? In this instance, my content knowledge was strong, but my pedagogical content knowledge was lacking. It is inevitable that your learners are going to have questions and if you are not confident with the subject matter, how are you going to be able to fully support them? I feel as though this goes to show that teachers need to be prepared for all circumstances. Children, I have come to learn, are very unpredictable, however, as their teacher, we should try to predict their needs as much as we can. Luckily, I was able to use ICT equipment to show the children photos and videos of squirrels, and once the children were back on task, the work produced was a lot more meaningful as the children were able to identify with and understand what was expected of them.

My PTE has shown me how important it is to lead by example when teaching children; specifically, children who may be new to English. As previously mentioned, my placement school has a high number of new to English students and it was easy to forget that these children do not always have the prior subject knowledge that you would expect children of their age to have.

I therefore took this first lesson, looked at the areas where I fell short and considered in depth with the help of my mentor, what my next steps would be. Unsurprisingly, both of us came to the conclusion that I had to be more specific with my instructions for the children and that I had to ensure that I was giving them better stimulus to engage and scaffold their learning. To combat these issues in following lessons, I started to concentrate more on what the children as individuals in my classroom would need, rather than what I believed that they should need for their age and ability.

Foundation

If I look at my teaching in terms of The Knowledge Quartet which I have previously discussed in my review of literature, my first step would be to look at the Foundations section of the Quartet. In relation to the previously discussed lesson, my first consideration would be my own knowledge and understanding of the topic in which I was teaching. This wasn't necessarily a problem for the majority of my lessons, it was more so the way in which I presented this knowledge that caused an issue, meaning that the next step – understanding how children learn and how they can be taught - was where the main issue I believe that I had lay. I had explained the lesson and terminology in a way that I believed was accessible for all the children, making the assumption that they all had a firm basis on which to write their work which was my first mistake. I hadn't taken into consideration that there would be a better way to teach the particular skill to them that would be more beneficial. From this error, for my next lesson I was sure to provide stimulus that explicitly gave the children examples to work from. For example, the lesson following my first was to write a poem about soldiers, poppies and the first world war. I created word banks, showed images of all the subject matters, and placed resources on every table that I hoped would either trigger prior learning or at least give them a place in which to start. I also had to reconsider the terminology that I was using – similarly to the transformation section - to ensure that it was appropriate for both the students in my class who did possess the prior knowledge needed for this session (and the ones to follow) and the new to English students who maybe did not have a prior basis on which to base their learning.

I found this section particularly difficult when teaching Welsh Language as I do not feel confident with the subject. Due to my content knowledge being poor, I felt as though my pedagogical content knowledge was also affected. I had been given examples through university and my school mentor of how to teach Welsh lessons, but due to my own lack of understanding of the content, I found it difficult to apply these different methods of teaching and pedagogy to my lesson.

Transformation

My next step if following the KQ would be to consider, as previously mentioned, that I was always selecting appropriate materials to support my learners work. I do feel as though my literacy lesson fell short in this aspect, so it was an area that I felt needed great improvement. For my literacy lessons following this initial one, I ensured that I always when possible had resources that would enable all learners in my class an equal opportunity to be able to complete the task and access the activities. As mentioned briefly in the foundation's sections, I also had to make sure that I was specific when introducing new skills such as similes and alliteration, ensuring that the learners in my class were able to grasp the concept and that I was able to model these skills in a way that was clear to all learners.

I found this section of the quartet to be extremely evident in several of my mathematics lessons. I found that on more than one occasion, I had to make sure that I was presenting the knowledge in a way that the children would understand as following one lesson on different types of angles, it became apparent that a number of the learners had struggled to grasp the concept. I then had to spend half of my following lesson recapping this but made sure that I used a method that I believed they would understand. The use of terminology in maths lessons also had to be a lot more exact and definitions more precise, to ensure that learners were able to comprehend the skill correctly.

Connection

The connections section is an aspect of my teaching that I always found complicated to navigate in my teaching practice as it was apparent from my first lesson through to my last that all the children had very different levels of prior knowledge. I had a child in my year 3 class who had only been attending school for 5 months and I had 3 children who spoke very little English. With this in mind I sometimes found it difficult to plan lessons in which I could build on their prior knowledge (sometimes not knowing what that was) whilst at the same time trying to make sure that the other children in my class were still gaining beneficial learning experiences in relation to their prior knowledge. Although my class were split into 4 ability groups, it was very unlikely that on any table, the children were all at the same level of understanding, which meant knowing when and how to differentiate and challenge was always an area of difficulty. In relation to my literacy lessons following my first initial session, I soon realised that I had to take a “back to basics” approach. Every child in my literacy class had some level of prior subject knowledge, so my task was to use my pedagogical subject knowledge in order to allow for the learners to make connections in their learning and build upon what they may already know.

I found this section easier to navigate in mathematics. I had a very clear understanding of the children in my set and what levels and outcomes they were at in their learning. For example, I had a split set for mathematics, meaning I was teaching both year 3 and year 4. In all lessons, I was stretching those year 4 learners (and any capable year 3 learners) to hit outcomes from the year above if and when appropriate. I also knew that in some cases, the year 4 children had already covered material that needed to be introduced to my year 3 children, meaning that I was looking again to progress those year 4 learners onto a different skill.

Contingency

The final part of the Quartet, Contingency, related to being able to respond to learners’ questions and deviate from my plan, was a part of teaching that I faced most lessons, no what the area of learning was. As mentioned in all other members of the quartet, I was never really able to predict what my learner’s prior

knowledge was, so in some lessons I would need to completely deviate and do a whole different lesson, before being able to fulfil the one in which I had thoroughly planned and prepared for and this happened in my very first taught lesson. I had to stop the class and create a mini plenary that would answer the question that I had been asked. This question highlighted to me that this learner may not be the only one struggling with the work that I had set. Rectifying the issue and ensuring pupil progress and understanding became more important than finishing my planned lesson in this instance.

Following an observation in which my feedback was to introduce mini plenaries throughout my longer sessions, I found that sometimes adding these on the spot created more effective learning. For example, during a science lesson on electricity and circuits, I stopped the lesson when I realised the children were not able to build working circuits. We then came back to the carpet and made human circuits, whilst discussing why the ones they had made were not working. When the children went back to their groups, they had more knowledge on the subject (knowing that the circuit had to be complete to work) and then were able to complete the task. This highlighted to me how using different techniques and being sound in both content knowledge and pedagogical content knowledge can impact my lesson.

As the main focus of most of the literature that I have read focused on maths, I have also tried to consider this in relation to my teaching of the subject. As we are moving towards a more holistic curriculum in Wales, it can be seen as essential to include areas of Mathematics (as one of the 3 cross curricular subjects) into most areas of learning. I considered the fact that my mathematical knowledge would have to be in depth in order to be able to integrate it comfortably into lessons such as literacy or creative arts where you do not usually see mathematics. I do feel as though with the introductions of Successful futures, teachers overall Content Knowledge will need to be heightened, but only if there is also huge emphasis upon more than just that learned content. The new curriculum gives teachers more freedom to teach in a way that is natural to them, in essence allowing more room for development of Pedagogical Content Knowledge. However, with a combination of the established approach of a subject-based curriculum that we currently see in schools, with a more active approach based on skills and competences, the need for an extremely in-depth content knowledge could be seen to be lessening (Donaldson, 2015).

In Conclusion I feel as though even with the introduction of a new curriculum in Wales, the need for teachers to have a strong Content Knowledge and Pedagogical Content Knowledge is still essential. However, I am not arguing that this alone should be the main basis for what makes effective teaching. As mentioned in my review of literature by Hattie, effective teaching is largely down to teacher attitudes and the relationships between teacher and student. Knowing your students and what they need in order to thrive under your instruction in my opinion, plays as strong a role in effective teaching and learning as your content knowledge does. It did, however, become apparent in my teaching experience, that the tasks in which I provide children

need to have explicit instruction, clear examples and resources that can provoke questions and suitably support the needs of my learners.

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