

A Critical Analysis of The Relationship Between Teacher Subject Knowledge and Effective Learning and Teaching In The Primary School

Introduction

In this assignment, I will first review and discuss literature on the relationship between teacher subject knowledge and children's learning. I will then consider the literature I have reviewed, whilst critically evaluating, analysing and reflecting on my own knowledge within primary teaching. I will be basing this on my first Professional Teaching Experience (PTE) within my placement school. Throughout the essay, I will not name the school that the observation took place in, the children (refer to children as Child X etc) or the staff to ensure anonymity. I have also taken into account ethical considerations in accordance with BERA (2018).

The school my PTE took place in, was a two form English medium nursery and primary school, located in The Vale of Glamorgan. The school was built to accommodate an amalgamation of two primary schools in the area. There are currently 370 children enrolled, ranging from age 3 to 11 years and the pupil teacher ratio is 23:2 (Welsh Government, 2018). According to the Welsh Government, in 2017 attendance rates were 95.0% and in 2018 the percentage of free school meals (FSM) was 11.3% (Welsh Government, 2018). The school is waiting on their first ESTYN visit and have been categorised by the Welsh Government in 2017 as a yellow school (support category, will receive up to 10 days of support) (Welsh Government, 2018). My placement was in a Reception class with 33 students (18 males, 15 females), with two classrooms available for the children to use. The class teacher was assisted by three teaching assistants and a volunteer every Friday morning.

Literature review

Coe, Aloisi, Higgins and Major (2014) believe effective teaching can be defined as practice that leads to improved student achievement, based on outcomes relevant to their future success. It is comprehensible to base effective teaching on improved student achievements,

due to the concentration on assessed learning in schools and children being marked and levelled against outcomes within the curriculum (Coe et al. 2014). Historically defining what contributes to effective teaching has proven difficult. Metzler and Woessmann (2010) argue that defining exactly what contributes to effective teaching is not easy, due to all teachers differing greatly in how much they teach their students (in terms of content), with little known about which teacher attributes account for this. Hattie (2012) acknowledges that all teachers teach differently, thus emphasising the difficulty in being able to define certain characteristics or factors that lead to effective teaching within the primary school. However, although Hattie (2012) acknowledges the difficulties with defining this term, he believes these differences are respected, categorising them as 'teaching style' and 'professional independence'.

As far as defining what contributes to effective teaching is concerned, educational research in recent decades has provided captivating evidence that the quality of learning opportunities created by teachers affects students learning (Kleickmann, Richter, Junter, Elsner, Besser, Krauss and Baumert, 2013). Hence showing the importance of trying to find a strong relationship between teacher subject knowledge on effective learning for children (Kleickmann et al. 2013).

"In Britain, numerous policies have attempted to strengthen the subject knowledge of primary teachers" (Poulson, 2001, p.40). Frameworks have been put in place within this area of interest to try and determine what factors affect children's learning. An example of one of these frameworks has come from Coe et al. (2014) who believe that there are six common components that teachers should contemplate when assessing their teaching quality and how effective their teaching is. These components consist of; content knowledge, quality of instruction, classroom climate, classroom management, teacher beliefs and professional behaviours (Coe et al. 2014)

Another framework is called 'Knowledge Base' that includes categories of knowledge that teachers should possess as a minimum. These consist of; content knowledge, general pedagogical knowledge, curriculum knowledge, pedagogical content knowledge, knowledge of learners and their characteristics, knowledge of educational contexts and knowledge of educational ends Shulman (1987).

Within educational research particular interest has been focused on teacher's subject knowledge, looking at their content knowledge (CK) and pedagogical content knowledge (PCK) (Kleickmann et al.2013). With respect to research taking particular interest into teacher subject knowledge and content knowledge, Shulman (1986) noted that not only do teachers need an understanding of content knowledge, they need to be able to develop it further. Shulman (1986) and his colleagues introduced a new conceptualization of teacher content knowledge. They suggested the idea of a special realm of teacher knowledge, that they referred to as 'pedagogical content knowledge'. Referring to this term, they believed there is content knowledge unique to teaching, a special nature of the subject matter knowledge required for teaching and making the content accessible to students (Shulman, 1986). Shulman was a pioneer for this area, believing that teachers should not only just understand why something is so, but they need to understand further why it is so. He believed that teachers need to think about how to present this knowledge in a way that makes the content accessible for students. Despite Shulman's focus of subject knowledge base in secondary schools, this work still influenced many British studies of primary teachers in the early 80s and 90s (Poulson, 2001).

Askew, Brown, Rhodes, William and Johnson (1997) found that in their study of 90 primary teachers, gaps in subject knowledge did not seem to have as detrimental effect on children's' learning as one might expect. Ultimately, they concluded that although some teachers lack in their subject knowledge, "it is not clear how much this affects their effectiveness" (Askew et al,1997, p.59).

Building on the belief that good subject knowledge improves student achievements is exemplified in the literature below.

Hill, Rowan and Ball (2005) examined the importance of knowledge within the subject matter of mathematics. From a number of studies they had cited, their findings were consistent with the idea that teacher subject knowledge has a relationship with student achievement. They found the teachers level of understanding of the area they are teaching (in this case mathematics) was related to how effectively students learn it. Within their own analysis, they found the difference between high and low scoring teachers on their content knowledge was associated to more than a month additional learning for students in a year. These findings have a similar relationship regarding strength of relationship with socioeconomic background

and attainment on student's achievement. It must also be acknowledged that other factors as shown above can influence students achievements, factors such as characteristics of the teacher, students and school (Coe et al. 2014). Thus going back to the difficulty of defining what effective pedagogy is and the relationship on children's achievement.

We must consider the accuracy of these findings when looking at teacher subject knowledge as a whole, due to the investigation carried out by Hill (2005) only focusing on teacher's content knowledge within mathematics. Considering this study was based solely on mathematics it may not be a true representation in other areas of subject, this is justified by findings that mathematics teachers with a higher degree were associated with more student learning, however the same relationship was not found in other subjects. Grossman, Wilson and Shulman (1989) supports the idea that taking into account the differing commands in secondary teachers preparing one subject, whereas primary teachers plan for five or six subject, research from secondary teaching must be drawn cautiously with regards to same effect within teaching in the primary school.

Furthermore, Metzler and Woessman (2010), predicted a causal effect of teacher subject knowledge on student achievement. Their findings show that the same student taught by the same teacher in 2 subjects, performed better in one of the subjects the teacher had more knowledge of. These findings show that teacher subject knowledge has a statistically and quantitatively greater impact on student achievement (Metzler et al. 2010), thus showing that teacher subject knowledge is a relevant factor that can be observed from teaching practice and plays a part of the overall quality in a teacher.

Thus far the literature has shown positive relationships between teacher subject knowledge and student achievements. Building on from the base knowledge of teachers (subject knowledge) the effects of pedagogical knowledge within teaching must also be considered, as stated as an important area mentioned earlier by Shulman (1986).

A case study that supports Shulman's theory of pedagogical knowledge being essential in teaching, came from observation on a trainee named Naomi following her PCGE course. Naomi had specialised in 'lower primary' within teaching, she is a philosophy graduate and has an A* GCSE mathematics grade, thus indicating she has good subject matter knowledge within mathematics. Naomi showed a good understanding of the subject and appeared to

have introduced the concept of subtraction to the children well, however, when it came to the children applying this knowledge within practice they seemed to struggle. With regards to this basing it on the knowledge quartet area of transformation where Shulman believes that “the capacity of a teacher to transform the content knowledge he or she possess into forms that are pedagogically powerful” (1987, p.15). This showed that although Naomi had the content knowledge shown in previous studies to improve student achievements, her pedagogical knowledge was not effective enough, as the children could not access this knowledge. Meaning that in this case, good teacher subject knowledge was not enough to have a positive effect on the children’s learning, as she couldn’t transform the content to be accessible to them.

Similarities to Naomi’s case of struggling with the pedagogical knowledge (due to being newly qualified in teaching) came from Evans, Hawksley, Holland and Caillau (2008) who found that trainee teachers soon realised they had to consider pedagogical views in their teaching. In this case trainees found pedagogy and practice packs to be a great help for their pedagogical knowledge. It would be interesting to have seen if Naomi was given something like this, would it have impacted her pedagogical knowledge on student achievements positively?

A more up to date study, perhaps suggesting more validity, focuses on the relationship between newly qualified teachers and subject matter knowledge supporting the findings from the more dated study. Diezman and Watters (2014) carried out a three-year project on a newly qualified teacher to observe and explore their experiences in teaching. Abi (the newly qualified teacher in this case study) had advanced subject matter within science, thus causing interest as to whether her strong subject matter knowledge would have a relationship with student achievement, even though she was a newly qualified teacher. Abi concluded that her advanced subject knowledge in science did not inevitably make her a better teacher, but did enable her to use her prior experience and narratives to engage students. Diezmann and Watters (2014) somewhat agreed with Abi’s conclusion; they drew from the study that her knowledge base showed a teacher with high levels of subject matter knowledge but there was room for developing the pedagogical skills necessary to engage students. Therefore, showing that subject matter knowledge can assist with teaching in that subject but not

necessarily having a strong positive relationship with pedagogical knowledge, that Shulman believed is essential within a teacher (Shulman, 1986).

However, according to Ball (2008) the bridge between knowledge and practice is still inadequately understood and Shulman's framework on this 'pedagogical content' still needs to be developed further. The term 'pedagogical content knowledge' is used widely, however the term has lacked definition and researchers over the past 20 years have used it differently across and within subject areas (Ball, 2008). Thus, meaning in terms of relating pedagogical content knowledge to the practice of teaching, there have been significant differences of how it is being used in teaching. It is important to clarify what is known about effective pedagogy before thinking about how to use it.

In contrast to Ball's (2008) statement about the bridge between knowledge and practice, Rowland, Huckstep and Thwaites (2003) used Shulman's ideas in their initial research to observe how content knowledge appeared in their teaching. Focusing on subject matter knowledge and pedagogical content knowledge, they created a framework for identifying and discussing primary teacher's mathematics content knowledge in their teaching (Rowland et al., 2003). The framework consists of four dimensions, foundation, transformation, connection and contingency, and named as the 'knowledge quartet'. The area that shows similarities and connection to Shulman's theory of pedagogical knowledge is the 'transformation' section. Rowland et al (2003) states that the transformation category concerns knowledge in action when teachers are planning their teaching and carrying out their teaching. Thus, showing the knowledge being used in practice.

A constructivist view of learning provides a valuable perspective on children's contribution within lessons. To put aside children's perspectives or to simply ignore them is 'wrong' and can be constructed as a lack of interest in what it is that the child has thought of. A possible reason why some teachers may do this is according to Brown and Wragg (1993) "Our capacity to listen diminishes with anxiety" (p.20). Therefore, if a teacher is not confident with their subject knowledge, this may induce anxiety, and lead them to not consider their students' contribution.

In Naomi's case, mentioned above, following the knowledge quartet areas, her contingency showed that she didn't see the significance of one of the children's unexpected explanation

and insisted she knew a better way, and urged the other children to count on from the smaller number. Where in fact, the child had used the way she had shown at the start, but she hadn't implemented this into practice. Due to Naomi not expecting an answer like this, it appeared she became anxious about children not carrying it out the way she wanted them to and that led to her not considering the child's input. Had Naomi's pedagogical knowledge been more apparent she would have seen the importance of continuing to 'scaffold' in her lesson, as she gave an example of the new content but did not allow the children to continue this process as she had not planned for it. Van Es and Sherin (2002) understands the value of teachers learning to notice significant classroom interactions and interpret this information to inform pedagogical decisions.

Moreover it appears that when looking at subject knowledge and pedagogical transformation, it is far more complex in relation to primary school teachers compared to secondary school teachers. There appears to be little evidence of a relationship between teacher knowledge in a particular subject and effective teaching within primary schools. (Poulson, 2001)

Analysis and evaluation of own subject knowledge (1,750 words)

At this current time in the curriculum in Wales, it is imperative that teachers are ready and eager to take on new subject knowledge and gain the pedagogical knowledge of new subject matter. This is due to Donaldson's proposal of the new curriculum following his 'Successful Futures Document' which will be implemented within schools in Wales. The Donaldson Report (2015) brought to light and set out a new vision for curriculum in Wales, for all learners aged three to sixteen. This new curriculum is designed to interest and engage young people and enable them to achieve, a feature of Shulman's pedagogical knowledge that teachers should attain (Shulman, 1987). Donaldson stated that "Taking full account of the implications of pedagogy, therefore, will be vital if the recommendations of this Review are to have the intended positive impact on learning and achievement" (Donaldson, 2015, p.63).

The areas of learning, will be changed to "Expressive Art, Health and Well-Being, Humanities, Languages, Literacy and Communication, Mathematics and Numeracy and Science and

Technology” (Donaldson, 2015,p. 39). Donaldson also recommended that Literacy, Numeracy and Digital competence need to be cross curricular and used in all lessons where appropriate. Therefore teachers will need to be secure with the new areas/subject matter and then apply the pedagogical knowledge in their teaching (Donaldson, 2015).

Taking into account the new curriculum whilst planning my lessons, I wanted to carry out a lesson that linked to an area of the new curriculum ‘Expressive Arts’, as well as bringing in the digital competency framework into the lesson (see appendix 1 for lesson plan). Reflecting on this lesson I used the knowledge quartet (Rowland et al. 2003) as an aid to see how effective my teaching was and taking into consideration the teacher’s feedback about my lesson/teaching from observing me.

I was aware of the purpose my lesson had on their learning in this area and the conditions my class found effective to their learning (Rowland et al.). For example, the lesson linked to previous knowledge as it was based on ‘the Moon’, the theme for the term (foundation and connection components of the knowledge quartet). The teacher’s feedback related to these areas of the quartet and stated that I informed the children of the learning outcome, prepared the children with a clip about the moon, and was successful in linking it back to the theme the class had been learning about. Leading on from the introduction, I transformed the content knowledge I wanted the children to learn/gain by modelling to the children what was expected from this activity (transformation area). Thus linking to Shulmans idea that teachers should be able to transform content knowledge into something pedagogically powerful (1987, p. 15). With regards to contingency in my lesson, the children had the opportunity to share their ideas, however due to the time constraint there wasn’t much time to act on their responses. Within this area there is opportunity to find out from the children’s perspective how and if they are making sense of the lesson (Rowland, 2003). Within the teachers observation notes on my lesson, she found I moved on too quickly within the lesson to achieve the outcome, thus resulting in what the children had gained from the start of the lesson, getting lost in the next section. Thus meaning, the final part of the lesson did not support or build on the children’s understanding. Had my base knowledge been more developed within this area of learning, I may have noticed like the teacher did, that the content knowledge of this lesson was getting lost. Leinhardt, utman, Stein and Baxter (1991) found that experienced

teachers overcome such things by stopping the learners during the activity to assess progress of lesson and see understanding.

Subsequently my content knowledge within a literacy activity also had an effect on my pedagogical knowledge, thus affecting the children's learning. The activity was focusing on 'oracy' within literacy, however the way I was assessing the children was based on their writing. Therefore I had the knowledge of how to make the writing accessible (Read, Write, Inc method) for the children to complete (pedagogical) but due to my lack of content knowledge within literacy, the children didn't receive this knowledge. Thus showing the importance of teacher understanding the content to then ensure pedagogical knowledge is present to make subject content accessible to children (Shulman, 1986). Coe et al.(2014) support the importance of teachers having deep knowledge of the subjects they teach, and when the teachers knowledge falls below a certain level, it has a significant negative effect on students learning.

However when this issue was made aware to me, I began to employ pedagogical knowledge accessible to the children and saw instant improved student achievements (see appendix 2 for examples).

An example of when my content knowledge was strong was within a 'forest school' activity, focusing on the knowledge and understanding area of learning. I found that due to this being strong, I took for granted and struggled to explain the subject 'man-made and natural materials' in a manner the children could understand. As I was secure with this knowledge I failed to recognise how this concept may be difficult and not accessible to some children of their age.

However, during a maths lesson where I felt my content knowledge was secure, I made sure to adapt resources and wording into a concept the children would understand. From reflecting on the lesson (see appendix 3) I was made aware of factors that I felt influenced student achievements in this lesson. Firstly looking at the fact the activity took place in an area of interest for the children instantly engaged them, showed it was a stimulating environment (Donaldson, 2015) and also showed the concept of this lesson was accessible to them with the opportunity of being pedagogically powerful for their learning (Shulman, 1986). With regards to the 'Transformation' area of the knowledge quartet within the lesson it was

apparent that I was able to transform the content knowledge of 'capacity' into something accessible and show the children how this could be done (Rowland, 2003). Contingency area of the 'knowledge quartet' was also apparent as child X started to use terms that were more advanced for his age. This however did not phase me as I knew he had advanced knowledge in maths and therefore had already planned to accommodate for this. The importance that I didn't ignore the advanced knowledge from the boy was shown when other children who were completing the task in his group becoming aware of this knowledge and trying to use it themselves. As mentioned in the literature previously referring to 'scaffold' which is where support is given to learners through questioning for example and letting them continue with the learning (Pritchard, 2005). My knowledge of this process allowed Child X to continue his learning in a concept he understand and also showed the other children, the next step in their learning. This also allowed for social constructivist Vygotsky's theory on 'Zone of Proximal Development' where he believes this refers to a gap between what children can do alone and what they are able to achieve with help (Waller, 2009). Within this lesson, Child X was acting as the more knowledgeable other to the children and helping them understand the more advanced knowledge. Pedagogical knowledge from myself was important when this happened as I knew the process that was going on.

Throughout my placement, I carried out observation sheets on the children during tasks, marking them against the lesson outcomes. I based how effective my lessons and my own subject knowledge were on students achievement by assessing the children against these outcomes with the 'Foundation Phase' curriculum. I was able to see if the children were accessing the knowledge intended and next steps for them in concepts they understood. Basing effective teaching this way is common due to children's work consistently being assessed against outcomes and therefore seen as a understandable way to base it on (Coe, et al. 2014)

When assessing how effective a lesson/teaching was that day, it is important to take into account other factors that may have had more of an influence on the child's outcome than the teacher subject knowledge. An example of this became apparent within my placement when Child Z seemed to be really disengaged and not accessing the learning in an area she usually strived in. Later that day, we became aware she was upset about an issue that had happened in a are she usually strives in. The next day I carried out the same task and she got

the content of the learning straight away and accessed knowledge. I wanted to carry out the activity again with Child Z, due to my beliefs that she could access the knowledge, Hattie (2012) believes teachers commitment and beliefs are the greatest factor on student achievement. Although my subject knowledge was not always as secure as it could have been, the characteristics I hold as a trainee teacher always helped the students achieve and grasp the concepts within lessons. Feedback from the Class teacher I worked with, stated that I had good engagement with all children and used positive praise throughout my lessons. The class teacher also said the children responded well to me and I have built a relationship with the children, showing their enjoyment and confidence when interacting with myself. Hattie believes that some teachers do things that make the difference. Slater, Davies and Burgess (2009) found that high-effect teachers compared with low-effect teachers have an effect on student achievement in a positive correlation. I will take the importance of teacher subject knowledge on student achievements throughout my career as a teacher but I will also make sure I always keep these characteristics of mine, that I feel and have shown have an effective relationship on children's learning.

Conclusion

To conclude, from reviewing the literature it is apparent that there is a relationship between subject knowledge and pedagogy and their impact on effective teaching.

However, it has been shown that it is difficult to determine exactly what effective teaching is. Therefore the importance of the frameworks that have been put in place to try and address this are essential. Studies showed a positive relationship between teachers' subject knowledge and students achievement levels, however taking into account Shulman's theory, teachers not only need to understand the subject they are teaching, they need to be able to develop this knowledge into concepts children will understand. Findings from studies looking at pedagogy showed that teachers' subject knowledge did have a positive effect on children's learning but it was not enough on its own for effective teaching.

Studies have suggested that due to primary teachers requiring subject knowledge in all areas of learning, studying the relationship between subject knowledge in primary schools is more complex than compared to secondary education. My experiences of teaching within a primary school support the literature found on subject knowledge and pedagogy. My experiences

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have also made me aware that other factors aside from subject knowledge and pedagogy can have an effect on a student's achievement.

With regards to the new curriculum recommended by Donaldson being implemented in schools in the foreseeable future, it will be an interesting time to be in education and to see how teachers will have to develop in order to deliver the curriculum to the highest standard, and enhance the learning experience for children.

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