

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

This paper will focus on the relationship between teacher subject knowledge and effective learning and teaching in the primary school. I will discuss texts which look in-depth at the importance of the relationship as well as the implications that surround it. Within this analysis, I will also consider how the developing curriculum in Wales may have an effect on the relationship, specifically in areas such as Literacy, Mathematics and Digital Competence. Following this analysis, I will discuss my experience with this relationship during my Professional Teaching Experience (PTE) and how it compares with the texts. My PTE took place in a primary school in a small urban area. The school has approximately 550 pupils and staff combined. It is a community first primary school which means the staff work closely with the surrounding community – providing a support system for families and local businesses. During my placement, I spent my time with a year one class made up of 21 pupils aged between five and six years old. Following the British Education Research Association (BERA)'s ethical guidelines for educational research, 4th edition: The confidential and anonymous treatment of participants' data is considered the norm for the conduct of research. Researchers should recognise the entitlement of both institutions and individual participants to privacy and should accord them their rights to confidentiality and anonymity (BERA, 2018:21). To protect the identity of the school and its stakeholders, any time it is mentioned I will use the phrase 'School A' and any names of staff or pupils will be changed.

To begin the analysis, the question that needs to be answered is, what exactly is subject knowledge? Is subject knowledge the teachers knowledge of the skills related to that subject or is it the content and topics related to that subject? For example, Numeracy is, fundamentally, skill based, meaning that there is no content needed to be learnt along-side the skills for the pupils to be able to learn it. Literacy on the other hand, is also skills based, but without content the pupils will find the learning of the skills far more difficult. A pupil would not be able to write an efficient piece of writing without first knowing what they are writing about.

The relationship between teacher subject knowledge and effective learning and teaching in the primary school is a widely discussed topic amongst scholarly writers, with the reoccurring debate that subject knowledge centres on the distinction between information and skills and which is more important for schools to focus on. In Wales, the new curriculum created by Donaldson, which is aimed to be taught in all schools from 2022, is predominately based on

teaching children skills rather than content. The Welsh Government website explains, ‘the new curriculum will have more emphasis on equipping young people for life. It will build their ability to learn new skills and apply their subject knowledge more positively and creatively. As the world changes, they will be more able to adapt positively’ (2017). The goal of the new curriculum is to put the importance of skill based learning first and applying knowledge to the skills after, as well as allowing the pupils to have a say in the content they want to learn. This will cause a change in the way schools are run as it will require teaching staff to be able to become more adaptable as aspects of a lesson could change depending on what the pupils decide they want to learn. Rockoff et al’s research supports the idea that subject knowledge doesn’t have to be at the forefront by saying that the correlations between a teacher’s subject knowledge and students performance has been typically very small or non-existent (2011), therefore giving teachers the option to bring their focus to becoming an expert in the required skills rather than in subject knowledge.

Other researcher’s argue that it is not possible to teach skills separately from content knowledge. It is believed by supporters of this argument that students are unable to learn the skill of writing, if they do not first have ideas, facts, principles and philosophies to write about (The Glossary of Education Reform, 2016). It is said that the ‘knowledge vs. skill’ discussion is nothing but a contradiction, as it is impossible to learn skills without content or learn content without skills. For effective teaching and learning to take place, the two must work hand in hand. David Didau (2011) poses the question asking if teachers should be teaching knowledge or skills. In an online article, *Should we be teaching knowledge or skills?* Didau expresses the notion that when a child begins learning, they have many pieces of unconnected knowledge. With the support of their teacher, they must then begin using their knowledge to complete tasks. By doing these tasks, they will increase their skills, thus making the connection between knowledge and skill stronger. Overall, Didau’s argument highlights the importance of skill and knowledge working together to improve pupil progress.

One of the foremost and most credited writers on this topic, Lee Shulman, looks in depth at the relationship in his report *Knowledge and Teaching: Foundations of the New Reform* (1986), in which he refers to a teachers subject knowledge as a ‘knowledge base’. He states ‘It [the knowledge base] represents the blending of content and pedagogy into an understanding of how particular topics, problems or issues are organised, represented and adapted to the diverse interests and abilities of learners’ (1987: 8). His theory explores how a teacher should not just know what to teach, but how it should be taught, making neither content or skill a priority. If a

teacher has an extensive knowledge on a subject, but does not have the pedagogical knowledge of how to teach the content, the learning experience becomes a wasted and ineffective opportunity. Shulman explains that teachers have worked with the ideology that teaching requires basic skill, content knowledge and pedagogical knowledge, however, these same teachers often have ‘difficulty in articulating what they know and how they know it’ (1987: 6). An example of how good pedagogical knowledge is needed to assist effective teaching is the case study of Nancy, who had spent 25 years in the teaching profession. On the first day of the observation, Nancy’s teaching style was described as ‘highly active’ and that her ‘pacing and ordering, structuring and expanding controlled the rhythm of the classroom life’ (Shulman: 3). However, the following observation saw Nancy unwell and unable to teach in her normal fashion. Despite this, she was still able to obtain engagement and focus from her class and the ability to give an effective learning experience, as her pedagogical knowledge allowed her to adapt the teaching in a way to best suit the situation. To further support this, a 2003 study at the University of Cambridge by Tim Rowland, Peter Huckstep and Anne Thwaites write about their concept called *The Knowledge Quartet*, which is described by the academics as ‘a tool for thinking about the ways that subject knowledge comes into play in the classroom’ (2003: 97). In their section titled *Transformation* they discuss how knowledge is demonstrated both in planning to teach and the act of teaching itself (2003: 98). They also refer back to Shulman’s observation that ‘the capacity of a teacher to transform the content knowledge he or she possesses into forms that are pedagogically powerful’, suggesting that there is an importance that a teacher is able to use their pedagogy as a tool to assist their teaching of subject knowledge.

To summarize, subject knowledge is a balance of all three elements discussed and based on the evidence there needs to be aspects of good content knowledge, good knowledge of skill and good pedagogical knowledge for effective teaching and learning to take place.

Once the meaning of subject knowledge is considered, it is now important to explore and compare the relationship between the subject knowledge and the effect on the pupils learning. By having an in depth subject knowledge, the teacher is given opportunity to go off from the structured lesson and explore the topic using pupil-led learning (Spiegel, 2014). For example, if a pupil or a group of pupils have a high interest in a certain aspect of the lesson, a teacher with a greater subject knowledge will have the confidence to adapt their lessons to suit the learner’s needs. Page, D. and Morris, L. from *The Critical Blog* discuss, in a post titled ‘*Why knowing your subject is so important*’ (2015), the effect a teacher with poor subject knowledge

has on a pupil's progress. They express the view that subject knowledge is identified as an important indicator of the quality of teaching, referring to the 2015 OFSTED *School Inspection Handbook* that states teachers need to '...demonstrate deep knowledge and understanding of the subjects they teach (46)', supporting their claim. The teacher has special responsibilities in relation to content knowledge, serving as the primary source of student understanding of subject matter (Shulman, 1987: 9).

Alternatively, although some level of subject knowledge is needed to begin teaching, if pupils are to pose questions to the teacher that they do not know the answer to, it can lead into a class research opportunity, allowing the whole class to work collaboratively and find the answer and adopting the approach of student-led learning (University of Leicester, 2018). The pupils will still be receiving effective learning without the need for the teacher to have complete subject knowledge. A down side to a teacher not having sufficient subject knowledge is that they could feel some anxiety towards moments like this arising and therefore not having the confidence to lead the children into finding out the answer. Sanders et al (1993) express their view that a teacher attempting to teach something outside of their subject knowledge seem to express some difficulty in structuring lessons, they seem to have a lack of confidence and depth when responding to questions as well as the lack of ability to challenge pupils' thinking. Consequently lessons become rigid, restrained and less creative. An example of this is when Shulman speaks of Grossman's 1985 study of a NQT named Colleen. On the first day of observation, Colleen was teaching a topic which she had a lot of subject knowledge on. In this lesson, it is described that she taught confidently and enthusiastically and that student participation was active in these sessions. However, in the following lesson, Colleen had significantly less subject knowledge and as a result of this, her whole teaching style had changed and unlike in the previous lesson, pupils were not given the opportunity to raise questions, putting a stop to them challenging their thinking and becoming better informed in their learning.

One way of beginning to analyse whether teacher subject knowledge has a direct impact on pupil progress would be in the comparison between primary and secondary phase learning. The secondary phase places a high importance on subject knowledge by employing subject specialists with pupils having a different teacher for each subject, instead of one for all. Primary schools employ one teacher to cover the whole spectrum of the curriculum, therefore, placing stronger emphasis on a pupils relationship with a teacher rather than the teachers subject knowledge. The obvious reason for this is that children in the secondary phase are working at

a higher level and therefore require subject specialists. However, it is important to explore how and if this has an impact on pupil progress. Scholars question why primary schools are not employing specialist subject teachers as they feel that this could improve the children's outcome. Dabell, J. (2017) discusses how although there have been some steps to make an improvement to teaching, many teachers admit that they are still 'winging it' and pretend that they have enough knowledge to teach a subject, he suggests that schools should 'employ someone with a hunger and thirst for their subject and you will make children hungry and thirsty for that subject too', indicating that secondary school teachers, who specialise in specific subjects, are able to attain a better engagement and witness more progress from the pupils in their class. Alternatively, Pezaro (2014) argues that one of the 'greatest strengths' of primary education is being able to integrate content and skills across all subjects with a cross curricular approach and the option to be flexible with how and what is taught. She believes that if primary schools followed the structure of a secondary school this would be lost. It is suggested by Pezaro that primary school children should not spend time away from their class teacher to be taught with specialist teachers. This is supported by Doumet, M-H. (2018) who says that staying in a class with one teacher helps create a bond which is 'essential to learning at such a young age'. Although they differ, both primary and secondary teaching approaches are good and necessary in a child's development.

To recap, a good relationship between teacher subject knowledge and effective learning and teaching in the primary school is created when all three elements work hand in hand. If one has a limited knowledge in a specific aspect, be it content, skill or pedagogy, it seems to have an impact on the overall relationship and learning that takes place.

During my PTE placement, I was able to experience first-hand the relationship between teacher subject knowledge and effective learning and teaching in the primary school. Throughout my time in School A, I was given the opportunity to teach many areas of learning and experience (AoLEs) and found many aspects that I thought I had a good level of subject knowledge in, as well as some areas that needed significant improvement. To put some context behind my lesson planning; the year one class that I spent time teaching was following the Cornerstones (2018) mid-term plan titled *Moon, Zoom!*

To start, I will be looking at the Literacy and Numeracy Framework (LNF) (2013). In one of the first Literacy lessons with my class, I decided that I would teach the pupils how to understand different types of writing, e.g. records of events, descriptions and narratives. I

decided, following the theme of the term, that the class were to write an incident report based on a previous lesson where an alien had crashed in their school playground. I created a model report that I wanted the pupils to follow and I used my own subject knowledge to create this, ensuring that everything I wanted the children to discuss was included. I wanted my pupils to be able to describe some of the evidence found at the crash site, so I first had to teach them the knowledge of adjectives. The lesson prior to writing the incident report, I allowed the students to explore the evidence and use their senses to help them come up with adjectives about the objects. These were then written onto a large piece of paper for the children to refer to the following day. In this instance, I found it was important for myself as the teacher to have a good subject knowledge on both incident report writing and adjectives. Both of these things were new concepts for the children so their knowledge was either very small or non-existent. I found that I had to be prepared to answer any questions that could arise as well as having the ability to stop any misconceptions the pupils had. As a result, the class was engaged and actively participating in the lesson and asking questions confidently, knowing they would receive a response. As a result, I saw children of all abilities completing the task (appendix 1) with little to no support needed, indicating that effective learning and teaching had taken place. Looking back at *The Knowledge Quartet* (2003), I think that this lesson used the framework that Rowland et al set out to ensure effective teaching. Following the units 'foundation (teachers knowledge), transformation (application of knowledge), connection (the order of teaching) and contingency (the ability to adapt)', the balance between all four allowed the lesson to run smoothly, giving both myself as the teacher and my pupils confidence to teach and learn respectively.

Overall, my Numeracy subject knowledge was of a high standard but I found that during these lessons, my pedagogical knowledge had a limited impact on the teaching and learning that took place during the lesson. Similarly to the Literacy lesson, I decided to teach the pupils a skill that they had not yet looked at. This skill being 'use counting on strategies to add two collections', I wanted to develop the strategy of counting on from a 'hidden number'. I began the session by going over number bonds to ten with the whole class, a skill they had all worked on in detail in previous lessons. As they were able to do this with ease, I then moved on to removing one number from the sequence and asking them to complete the equation. I expected a mixed response from this and I did this to gauge how much the children already knew. When it came to teaching the new skill, I soon realised that my planned lesson was not appropriate for the age group I was teaching, especially with the level of understanding they currently had.

In focused groups, the pupils were shown envelopes containing counters, this was their ‘hidden number’, once they had found out how many counters were inside, they were asked to count on from that number and make ten. My aim was to combine two skills and challenge the pupils learning. However, as they had limited knowledge in one area, the task proved to be too difficult. To further disrupt the flow of learning, my lack of pedagogical knowledge meant I did not have the confidence and ability to adapt the lesson on the fly to suit the children’s learning needs, consequently having a minimal effect on their learning. To resolve this issue, I reflected on the lesson in an Assistive Reflective Conclusion (ARC) (appendix 2) and thought about how I could approach the teaching in a different way. I decided to incorporate the theme of *Moon, Zoom!* into the next lesson to make the learning more relevant to my pupils as it was something they could relate to. This worked well and my next session was more successful. If I had a good understanding of pedagogical knowledge, I would have been able to adapt the lesson on the spot instead of having to reflect once the lesson had ended.

I found that my pedagogical knowledge was having an ineffective impact on the relationship between teacher subject knowledge and effective teaching and learning when, throughout the PTE, I had little opportunity – as well as some difficulty – in incorporating the Digital Competency Framework (DCF) into my lesson plans. I taught a lesson to the children on the topic of ‘E-Safety’, teaching them the required skill ‘begin to identify similarities and differences between online and offline communication, *e.g. follow same rules when communicating face-to-face and online*’ (DCF: Year 1 [2016]). I have a fair amount of knowledge in this subject area and I believe that I provided the children with an interesting lesson that engaged with their thinking and understanding skills, overall providing them with an effective learning experience. I was able to guide the children into a thought-provoking discussion about how they need to be safe when using the internet, as well as giving them the opportunity to explore pre-decided websites. The problem that I found with the DCF was bringing the skills into other subjects and applying a cross-curricular approach to my teaching and the children’s learning and using my pedagogical knowledge to be able to adapt a lesson to allow for the DCF to come into the learning.

Both of these experiences (Numeracy and DCF) reiterates the point written previously that suggests pedagogical knowledge is an important part of the teaching and learning experience. Without this knowledge, the relationship between teacher subject knowledge and effective teaching and learning is hindered as, without the knowledge of how to teach the content, the content is not successfully transferred into a pupil’s understanding. Numeracy, was hindered

by not knowing how to best teach the skills to the pupils and DCF hindered the teaching and learning as content could have been taught more effectively if I had known how to include it into my teaching.

I also had experience with Welsh Second Language. I find that Welsh is one of my weaker subjects to teach and that the level of subject knowledge I have in this area needs significant improvement. I knew which skills I wanted to teach my pupils during this lesson, but without an appropriate amount of subject knowledge, I lacked the confidence and ability to support the children in learning the required skill. The focus of this lesson was *Rownd y Byd*, a story of a lady who travels around the world on a magic carpet. Knowing that I had little subject knowledge in Welsh, I spent a lot of time before I needed to teach the lesson practicing the key questions and reading the story out loud, but with little support I was unable to build my confidence in teaching this topic. I went into the session with some anxiety about not having a good enough subject knowledge. As a result, I did not have the ability to support my pupils and although the skills were being taught, I could not assist them in further development and my lack of confidence also affected my method of teaching. Despite this, the children were able to complete the work I had set for them, but with my inability to support those who needed it, it was not completed to a standard that it could have been (appendix 3). Returning to the point aforementioned in this paper, a teacher with little confidence in their subject (content) knowledge will not give an effective learning experience to their pupils. Shulman believes that the teacher has a responsibility to know what they are teaching as they are the primary source of student understanding, and by not knowing enough Welsh to teach this lesson, the pupils would have felt as though they did not have a source of information they could come back to in order to enhance their learning.

To conclude, the relationship between teacher subject knowledge and effective teaching and learning in the primary school requires more than one factor to be successful. The term ‘subject knowledge’ should not be taken at a face value. Reflecting on the research I have found that knowledge of the content, the knowledge of the skills and pedagogical knowledge are all part of a unique blend that results in effective teaching and learning. Based on case studies and my own experience, it becomes clear that once all three factors are included in a lesson the most effective teaching and learning is able to take place. My own professional teaching experience gave me a first hand look at how important the relationship is as well as giving me an idea of areas I need to make improvement in as to ensure that every lesson that I teach to my pupils is an insightful and stimulating learning opportunity. Looking at the three factors of subject

knowledge, I am able to deduct that I need to develop my pedagogical knowledge as this area was slightly weaker. This can be improved through thorough research and more experience. Once I have developed this, I should see an improvement in my pupil's progress, as the research has concluded a strong link between good subject knowledge and positive pupil progress.

References

- Ball, D., & Hill, C. (2009) *Measuring Teacher Quality in Practice*. In Gitomer, D., *Measurement Issues and Assessment for Teaching Quality*. Washington, DC: Sage Publications
- Coe, R., Aloisi, C., Higgins, S., & Major L.E. (2014) *What Makes Great Teaching?* [ONLINE] Available at: <https://www.suttontrust.com/wp-content/uploads/2014/10/What-Makes-Great-Teaching-REPORT.pdf> (Accessed 08/01/2019)
- Cornerstone (2018) *Moon, Zoom!* [ONLINE] Available at: <https://cornerstoneseducation.co.uk/projects/cornerstones-curriculum-topics-england/topics-by-year-group-england/year-1-curriculum-projects/> (Accessed 05/11 - 13/12/2018)
- Dabell, J. (2017) *Why Primary Schools are Failing our Children* [ONLINE] Available at: <https://www.teachertoolkit.co.uk/2017/05/30/primaryfailure/> (Accessed 08/01/2019)
- Didau, D. (2011) *Should we be Teaching Knowledge or Skills?* [ONLINE] Available at: <https://www.theguardian.com/teacher-network/2011/nov/22/knowledge-or-skills-solo-taxonomy> (Accessed 10/01/2019)
- Donaldson, G. (2015) *Successful Futures* [ONLINE] Available at: <https://gov.wales/docs/dcells/publications/150225-successful-futures-en.pdf> (Accessed: 07/01/2019)
- Grossman, P. (1985) *A Passion for Language: From Text to Teaching*. Stanford: Stanford University, School of Education
- Guerriero, S. (2017) *Teacher's Pedagogical Knowledge: What it is and how it functions*. Paris, France: OECD
- Morris, J., & Page, D. (2015) *Why Knowing your Subject is so Important* [ONLINE] Available at: <https://thecriticalblog.wordpress.com/2016/02/18/why-knowing-your-subject-is-so-important/> (Accessed 07/01/2019)
- OECD, (2017) *Pedagogical Knowledge and the Changing Nature of the Teaching Profession* [ONLINE] Available at: http://www.iep.edu.gr/images/IEP/EPISTIMONIKI_YPIRESIA/Epist_Grafeia/EU_Policy/2017/2017-05-11_OECD-Pedagogical-Knowledge.pdf (Accessed 08/01/2019)

Pazero, C. (2014) *Specialist Teachers in Primary Schools* [ONLINE] Available at: <https://www.aare.edu.au/blog/?tag=specialist-teachers-in-primary-schools> (Accessed 07/01/2019)

Rockoff, J., Jacob, B., Kane, T. & Staiger, D. (2011) *Can you recognise an effective teacher when you recruit one?* [ONLINE] Available at: <https://www.nber.org/papers/w14485.pdf> (Accessed 09/01/2019)

Rowland, T., Huckstep, P., and Thwaites A. (2003) *The Knowledge Quartet*. In Williams, J. *Proceedings of the British Society for Research into Learning Mathematics*. University of Cambridge.

Sanders, L., Borko, H. and Lockard, J. (1993) *Secondary Science Teachers' Knowledge Base when Teaching Science Courses in and out of their Area of Certification*. Journal of Research in Science Teaching.

Shulman, L. (1987) *Knowledge and Teaching: Foundations of the New Reform*. Stanford University

Spiegel, P. (2014) *Off-topic tangents are a good thing for class* [ONLINE] Available at: <https://petespiegel.com/2014/11/10/off-topic-tangents-are-a-good-thing-for-class/> (Accessed 09/01/2019)

The Glossary of Education Reform (2016) *Content Knowledge* [ONLINE] Available at: <https://www.edglossary.org/content-knowledge/> (Accessed 08/01/2019)

The Welsh Government (2013) *Literacy and Numeracy Framework* [ONLINE] Available at: <http://learning.gov.wales/resources/browse-all/nlnf/?lang=en> (Accessed 10/01/2019)

The Welsh Government (2016) *Digital Competency Framework* [ONLINE] Available at: <http://learning.gov.wales/resources/browse-all/digital-competence-framework/?lang=en> (Accessed 10/01/2019)

The Welsh Government (2017) *New School Curriculum: Overview* [ONLINE] Available at: <https://beta.gov.wales/new-school-curriculum-overview> (Accessed 09/01/2019)

University of Leicester (2018) *Student-Led Learning* [ONLINE] Available at: https://www2.le.ac.uk/offices/lli/developing-learning-and-teaching/enhance/strategies/copy4_of_active-learning (Accessed 08/01/2019)

Appendix 1 – Evidence of children's incident report work

★	8- November 2018 I can write an incident report.						★	○	
I	HS	MS	LS	PS	VA	Cold	Tepid	Hot	○



* You have used capital letters and full stops.
 → Try to connect your cursive letters.

Incident Report

Investigator's Name:

What happened? Alien crash site in the shed.

What clue did you find? Alien slime.

Can you describe the clue? Slimy yucky sticky wet.

Appendix 2 – Numeracy lesson ARC

Assisted Reflective Conclusions (ARC)

Date: 14/11/2018

Critical incident (focus): Adding on from a hidden number

Experience	
Feelings <i>"What are your feelings regarding the experience?"</i>	I feel as though the concept of this lesson was quite difficult for the children in the class to understand and as a result I feel like the introduction I gave was not strong enough to capture the children's focus.
Remember and Understand <i>"Can you list the aspects of the learning experience that went well?"</i> <i>"What were the elements of the learning experience that were disappointing?"</i>	After a lot of repetition and exploring different ways of explaining the concept, some children began to understand the method and were able to work out the answers to questions independently. I attempted to differentiate the learning for the different ability groups, but as it was a challenging new area of learning for most of the children, I do not think I differentiated enough and that it needed to be simpler for the lower ability children as well as less of a challenge for the higher groups.
Evaluate and analyse <i>"What will you keep the same to ensure effective teaching and learning in the future?"</i> <i>"What was the cause of the most important disappointing element?"</i>	To ensure effective teaching in the future, I will keep to having small focused groups to explore new concepts so to be able to engage with every child and make sure that they have some level of understanding of the work. I think that due to it being quite a difficult topic and my lack of knowledge of what the children are currently able to do in this area meant that I did not differentiate enough to gain an effective learning experience for the children. Also, given the time restrictions of the lesson I couldn't spend long with each group to really engrain the new addition method into their minds.
Conclusions and actions <i>"What are your possible solutions to the disappointing issues identified?"</i> <i>"What will you do next?"</i>	After experiencing this lesson, I now know that I need to make my focused group even more basic than I originally had. I need to make sure that for every group I give low numbers for them to add, so they don't feel like they have to focus on the sum itself but the method of finding the answer. Next, I need to think of another way of reintroducing the concept to further develop the children's understanding. I also need to find a way that can involve all of the children in the group, keeping them focused and prepared to take on the challenge of understanding the lesson.
Transformed experience	

Appendix 3 – Example of children's Welsh Second Language work

24 November 2018

I can match items from the story 'Rownd y Byd'

I	HS	MS	LS	PS	VA	Cold	Tepid	Hot
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8

VF

Ble?

Dwrci

Prynais i...

upi-1



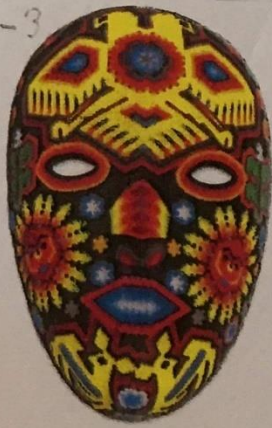
Yr Iseldiroedd

da-2



Fecsico

Tri-3



China



redwar-4



Swistir



kump-5



Affrica



saith-7



chwe-

Rwsia