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## Teaching Out-of-Field Internationally.

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## Chapter 3. Teaching out-of-field internationally

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**Abstract.** This chapter presents vignettes from six countries regarding the phenomenon of Teaching Across Specialisations (TAS) or as it is often known teaching out-of-field. The vignettes provide an overview of the education system and policies and practices relating to teacher education, certification, recruitment and assignment to subjects or year levels. They also provide insights into how teaching out-of-field is conceptualized, if or how it is officially reported, its extent and importantly any local, state or national responses to teaching out-of-field. The six countries included are Australia, Germany, Ireland, the United Kingdom, the USA and Indonesia. These countries have been selected because they have the most available published research relating to teaching out-of-field. The vignettes have been written by researchers and academics from each country who are working in the field. The vignettes highlight the need for a nuanced understanding of the phenomenon as it occurs in different contexts including both commonalities and differences. The chapter concludes with an overview of the occurrence of teaching out-of-field from an international perspective and provides a synthesis of the key insights gleaned from the vignettes. These insights are further elaborated in subsequent chapters to facilitate a deeper understanding of the phenomenon.

**Keywords.** International perspectives, teacher assignment, vignettes, Teaching out-of-field, teaching across specialisations.

### 3.1 Introduction

Over the past decade researchers have begun to examine and report on the phenomenon of teaching out-of-field as it occurs across a range of international settings. This research indicates that there are commonalities in relation to the extent, possible causes, implications for students, teachers and education systems, attitudes about it and responses to it, but there are also differences. This, of course, is not surprising as even at a practical/technical level education systems, the way teachers are educated (or trained), teacher certification and assignment practices and

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understandings about teacher quality and the very nature of teachers' work vary both within nation states and across national borders. The phenomenon of teaching out-of-field cuts across a range of deeply contested issues regarding not only the nature of teachers' knowledge and teachers' work but even more broadly how knowledge itself has, could or should be divided into traditional (Cartesian) subject areas such as mathematics, science and social science.

Given the varied ways in which teaching out-of-field is defined and understood internationally at a practical/institutional level, philosophically and attitudinally there is great value in gaining a broader international perspective. International comparisons have the potential to highlight culturally specific factors that might not otherwise have been identified. Beliefs about the nature of teaching influence how teaching out-of-field is formally and informally understood and defined and therefore recorded, reported and importantly addressed. Understanding culturally specific variables that impact on the way teachers' knowledge and work is defined impacts on the extent to which the phenomenon of teaching out-of-field is deemed acceptable and a normal part of teaching or as a problem that needs redressing.

Thus it is insightful, as with any educational phenomenon within an increasingly globalized education system, to examine teaching out-of-field from different country perspectives, as local contexts matter. International collaboration is vital for: understanding what counts as out-of-field teaching and how it arises transnationally; enabling greater insight into how local conditions influence this practice; and raising possibilities for research and action to improve knowledge and practice of systems, leaders and teachers. This chapter provides an overview of teaching out-of-field in a number of countries, from which we can extract some key themes. The vignettes will provide an introduction to the phenomenon of out-of-field teaching as it currently exists across a range of international settings and will form the basis for further detailed exploration of the phenomenon in subsequent chapters.

## **3.2 Australia**

### ***3.2.1 Education system***

There are three school system providers in Australia – the public or government school system, the Catholic school system and private or independent schools. Each of these systems provide schooling for students from pre-school to upper secondary, typically in early childhood settings (less than 5 years old), primary schools from Years K-6 (5 – 12 years old) and secondary schools from Years 7-12 (12 – 18 years old). However, many schools in each system provide schooling for students in more than one sector. For example, many new schools in high growth metropolitan areas are K – 9 schools, with schools catering for upper secondary (Years 10 -12) serving

a much larger area. Accessing secondary schooling for students living in remote locations, including remote Indigenous communities, is difficult. These students access secondary schooling remotely or leave home and attend boarding schools in near or far away towns and cities. These characteristics of the Australian education system have implications for out-of-field teaching and teaching across subject boundaries.

### ***3.2.2 Teacher education and certification***

In Australia, both state and federal governments have a role in policy and funding of schooling. Up until 2014 state governments controlled school curriculum, requirements for qualifications and teacher education course accreditation. This meant that not only were there some differences in administration and regulation of the public school system, there were also some differences in the secondary subject specialisation requirements across the systems. The national entry and course requirements for secondary teaching specialisation specified “at least a minor<sup>2</sup> study... and a minimum of one-quarter of discipline specific curriculum and pedagogy studies” (AITSL, 2011, p. 14). The requirements recommend completing a major study to teach senior secondary level (Years 11 and 12) and for some disciplines, such as physical education. These new requirements were higher for some subject specialisations in some Australian states than their previous minimum standards. The Australian Government has also mandated new requirements for primary teacher course accreditation so that teacher education student complete specialist studies in mathematics, science or a foreign language as a means of improving the quality of primary teachers who will still be regarded as generalist teachers.

### ***3.2.3 Terminology used for teaching out-of-field***

“Teaching across subjects” is not a term that is used in Australian education staffing or policy documents or by administrators and principals in systems. Whilst ‘out-of-field’ is used in some recent reports on teaching staff, the most common term used to describe teachers who are teaching subjects or year levels without completing specialist requirements is “less qualified” (Vale, Hobbs & Speldewinde, submitted). This term is commonly used by principals.

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<sup>2</sup> Minor study is defined as two years of tertiary study equivalent to two units of first year study followed by two units of second year study.

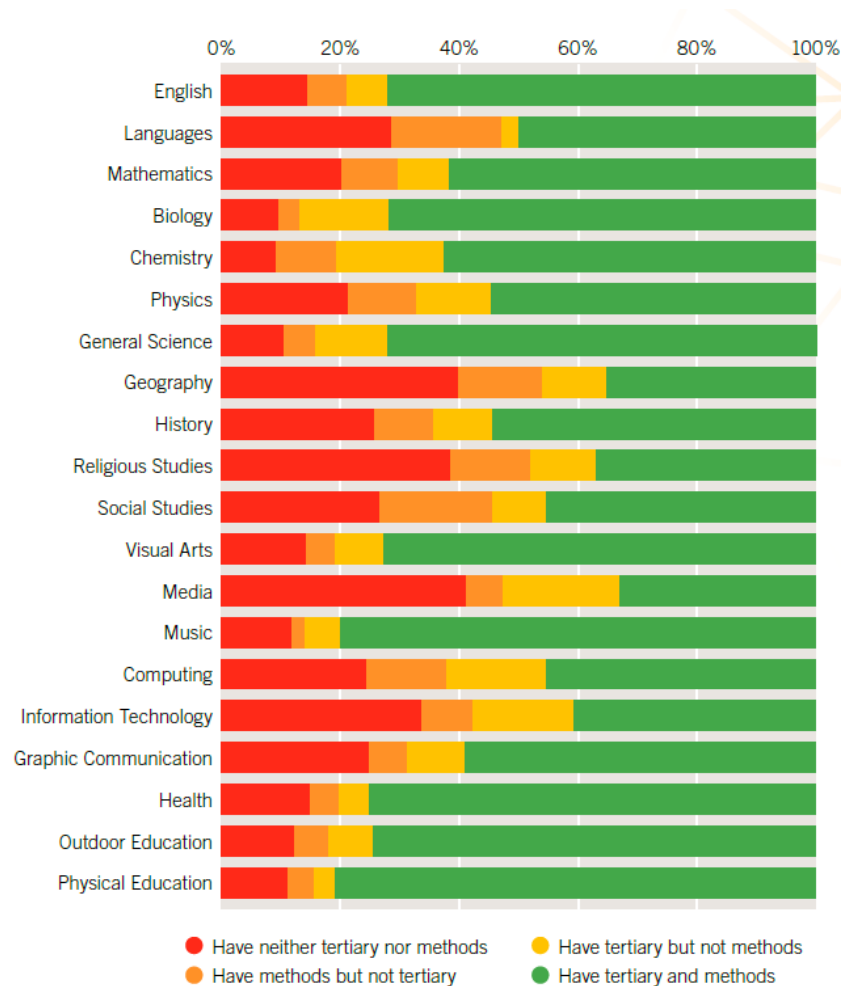
### ***3.2.4 Teacher assignment policies and practices***

In all but one state in Australia, New South Wales, teachers are registered as teachers rather than teachers of students in a particular sector or year level or of particular secondary subjects. In New South Wales graduating teachers receive ‘approval to teach’ specific subjects or levels of schooling from the registration body. However, this approval does not constrain teacher appointment or subject allocation which is at the discretion of the principal.

In the Australian public school sector, school autonomy with respect to the appointment of teachers varies from state to state. Victoria is the most autonomous; principals advertise and appointment of all staff. In Western Australia there are varied models with for example the recently established Independent Public Schools allowing principals to advertise and appoint staff directly and other public schools having a centralised state staff allocation system. Where the appointment of staff to schools is more centralised, principals still have the autonomy to allocate staff to teach out-of-field.

### ***3.2.5 Reporting and incidence of teaching out-of-field***

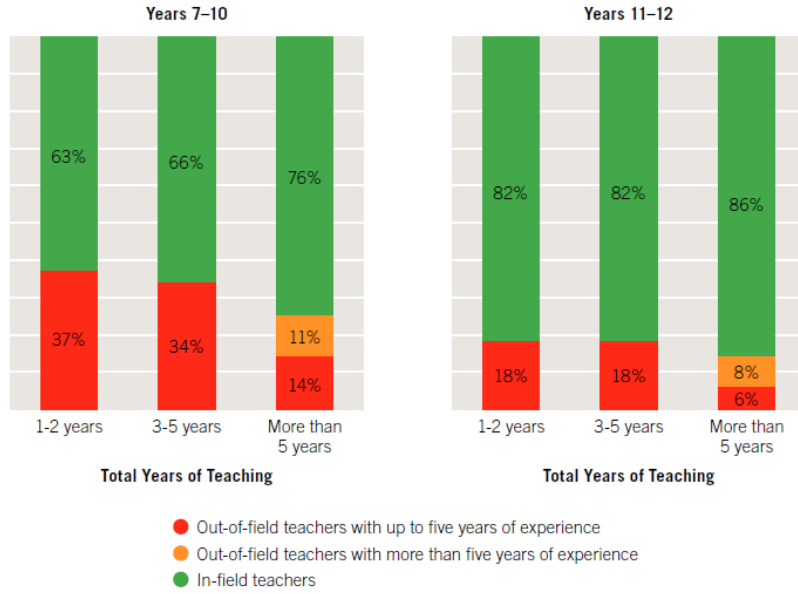
Reporting and tracking the incidence of out-of-field teaching in Australia over-time has proved problematic, due to differences in and changes to requirements for qualification between states and nationally. Weldon (2016) provided further analysis of the Staff in Australian Schools 2013 report to take account of the changing definitions. Three definitions of out-of-field were used when reporting the findings shown in Figure 1. The highest incidence of out-of-field teaching are for humanities subjects such as media, geography and languages. Among the STEM subjects information technology, physics and mathematics has the highest incidence of out-of-field teachers. However, these data are likely to be under-estimates as the definitions used when gathering data only identified study of at least one second year tertiary subject rather than completing two second year subjects. Note that Science is normally taught in Years 7-10 as General science, therefore a teacher with a physics background, for example, is required to teach the other science disciplines.



**Fig. 3.1** Proportion of Years 7-10 teachers teaching out-of-field in selected subjects (Source: Weldon, 2016, Figure 1, p. 3)

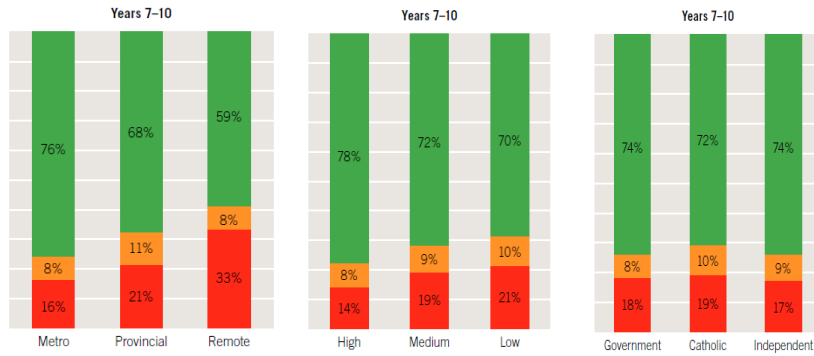
Figures 3.1, 3.2 and 3.3 provide information about the incidence of out-of-field teachers according to year levels, location and socio-economic status. However these Figures report findings that use the original SiAS definition of specialist as having “either studied the subject at a second year tertiary level or above, or trained in teaching methodology for that subject at tertiary level” (Weldon, 2016, p. 2). This definition then potentially includes teachers with a primary teacher qualification. Figure 2 includes information about the number of years teaching experience as less than 5 years and more than 5 years and show that a higher proportion of less experienced than more experienced teachers are teaching out-of-field. Another Australian study reported that up to 23% of graduate teachers with secondary discipline

specialisations qualifications are teaching out-of-field (Mayer, Doecke, Ho, Kline, et al., 2014) with secondary graduates with specialisation in humanities, the arts and health and physical education the most likely to be teaching out-of-field.



**Fig. 3.2** Proportion of Year 7-10 and Year 11-12 teachers teaching out-of-field (Source: Weldon, 2016, Figure 5, p. 10)

Figure 3.3 shows the incidence of out-of-field teachers, using the SiAS definition of in-field, is highest for secondary schools in remote and provincial locations and low socio-economic schools. Consequently schools in Northern Territory and Tasmania have the highest incidence (40% and 37% respectively). Surprisingly Victoria has a relatively high incidence (32%) since there are fewer remote locations when compared with other states. The incidence of out-of-field teaching does not vary much between school systems.





- Out-of-field teachers with up to five years of experience
- Out-of-field teachers with more than five years of experience
- In-field teachers

**Fig. 3.3** Distribution of out-of-field teaching by location, socio-economic status and system (Source: Weldon, 2016, Figures 6, 7 & 9, pp. 10 & 12)

The effect of out-of-field teaching can also be considered from the student perspective. The 2011 Trends in Mathematics and Science Survey (TIMSS) report found 34% of Year 8 mathematics students and 14% of Year 8 science students were taught by teachers with neither a tertiary major in the subject or teacher education for the subject compared to the international average of 12% and 8% respectively.

### ***3.2.6 Responses at a national, state or local level***

Across Australia a number of projects have used financial assistance to attract teachers to take up positions in remote and provincial locations. However, retaining teachers in these schools beyond the initial contract, continues to be a problem (Handel, Watson, Petocz & Maher, 2013). Almost all states have implemented professional learning programs for out-of-field teachers, though the structure of these programs varies and are not necessarily on-going or still operating. In New South Wales, the University of Newcastle is an example of a university that offers enrichment courses for mathematics teachers.

In Western Australia, the state government has implemented the SWITCH program which is a tailored training program to support: <http://www.det.wa.edu.au/careers/detcms/navigation/teachers-and-school-leaders/career-opportunities/switch-program/>

- Primary teachers to teach in secondary subject areas of need: science, mathematics and design and technology
- Secondary teachers to teach in an additional specialist learning areas. Currently mathematics, science and design and technology
- Lower secondary science teachers to teach upper secondary Physics, Chemistry and Maths.
- Teachers with languages experience to teach primary languages.

The WA state government provides funding for the course fees, teacher relief and other expenses where required. Courses are offered via tender by universities and can range from short courses (from one day) to Graduate Certificate level (e.g., one semester). Similarly, in Queensland, a restructuring of their school system to with the rest of the states and territories by bringing 'grade 7' into the secondary school (previously in primary school), has seen Graduate Certificates offered to teachers.

In Tasmania, Graduate Certificates were introduced specifically to attend to the high proportion of out-of-field mathematics and science teachers (Kenny et al. 2017).

In the state of Victoria, a Graduate Certificate in STEM Education is offered through the State funded “STEM Catalyst’ program, and was muted initially to support a junior teacher and a more leading teacher from 30 disadvantaged schools in the state (<http://www.education.vic.gov.au/about/news/Pages/stories/2017/storiescatalyststem.aspx>).

At a national level, a related to supply issues, the Teach For Australia (TFA) program was initiated to meet the short fall of teachers (<https://www.education.gov.au/teach-australia-0>). While not specifically attending to marinating the quality of teaching by out-of-field teachers, programs such as TFA and other state run initiatives designed to stimulate teacher recruitment are important for reducing the need for out-of-field teaching.

Providing professional learning, and funding and resources to enable mentoring, coaching and support in planning, teaching and assessment through collaborative practices is urgently needed for early career teachers as they transition from teacher education to teaching positions to teach within their specialisation and across subjects. Mentoring for example has been shown to be critical in a smooth transition of early career teachers into the profession. Most states have a policy where tat enables new teachers to have a formal mentor and have slightly reduced teacher hours to support their transition, however it is at the principal’s discretion as to whether both of these allowances are provided.

### **3.3. Germany**

#### ***3.3.1 Education system***

The Federal Republic of Germany consists of 16 independent federal states which have the full authority on education both at schools and universities. As a consequence, their policies are differing and influenced by the parties running the government (see, e.g., Cortina & Thames, 2013). Although there are some common features of teaching out-of-field in Germany, differences in regulations between the states complicate generalizations. The way initial teacher education, particularly in primary school, is organized can be one potential reason for the situation of teaching out-of-field. Future teachers need to study two subjects and gain a master’s degree for teaching at secondary school level in all states, however, for primary education two, three, and only in some states even more subjects are to be chosen (Porsch 2017). In the primary sector it is possible to gain teaching certification without having studied mathematics for example which results in a large extent of

mathematics being taught in primary schools by teachers who can be considered out-of-field.

### ***3.3.2 Teacher education and certification***

Initial or pre-service teacher education is university-based. In Germany it is followed by a pre-service school-based training phase, which in the German context is also called the ‘second phase’. By the end of this second phase, which takes up to two years, teachers graduate by completing their (first or second) state examination in both their subjects – or in even more subjects if they become primary school teachers. That means teachers receive their formal qualification that allows them to teach a specific subject at a specific school level after having gained both a master’s degree and having passed a state examination at the end of a school-based training. As in-service teachers there is the possibility of receiving this qualification after participating in an intensive in-service training course. With a few exceptions (e.g., second-career teachers) all other teachers teaching a subject without the subject-specific qualification, have to be considered as out-of-field teachers. One needs to know, however, that at primary but also at lower secondary level, particularly in year 5 and 6, the class teacher principle exists. That means that teachers normally teach the majority of subjects in one class. Due to a teacher shortage, especially in some subjects (STEM but also art and music education), the application of this principle has the consequence that German teachers might be faced with teaching out-of-field on a regular basis.

### ***3.3.3 Terminology used for teaching out-of-field***

In Germany teachers are politically and juristically not considered as out-of-field in a subject if they have received a formal subject-related qualification (so-called *Lehrbefähigung*).

### ***3.3.4 Teacher assignment policies and practices***

If there is a lack of teachers for teaching a specific subject, it is the task of the principal to cover all needs at his/her school. Thus it is at the principals discretion. Reasons for the existence of teaching out-of-field have for many years been related to the shortages in teacher supply. For example, the job market for science graduates is optimal and many students within teacher education courses at university are

accepted into science based industry although their previous study had been orientated towards schools.

### ***3.3.5 Reporting and incidence of teaching out-of-field***

Since the principal at a school is responsible for covering all teaching assignments at his/her school, deficiencies in specific subject teacher supply have not been captured by provincial administrations so far and there has been little or no public discussion of the phenomenon of teaching out-of-field. As indicated above teaching out-of-field in primary school has not been considered a problematic issue since primary school teachers are seen as generalists even if they have passed an education for specialists. Thus, no data from the government or the states is available. A representative national survey among fourth-graders and their teachers in all 16 states conducted in 2011 provided some numbers on the incidence of the phenomenon (Richter et al., 2012): On average 34% of all German teachers and 48% of all mathematics teachers regularly teach out-of-field. However, the numbers differ considerably between the states. By comparison there are more sources on the incidence for lower secondary level available. Again there is data from a national survey conducted in year 9 shows that up to 36 % of mathematics teachers, 31% of biology teachers, 25% of chemistry teachers, and 34% of physics teachers teaching in year 9 have no formal qualification for teaching the respective subject.

A recent study on language skills in year 9 indicates that up to 14.3% of German teachers and up 14.7% of all English as foreign language (EFL) teachers teach without having obtained the subject-specific qualification in their initial teacher training (Hoffmann & Richter, 2016). Unfortunately, a distinction between school types is not made. The yearly report by the state of North-Rhine Westphalia with a variety of school types shows that the incidence of teaching out-of-field is highly related to the school type and the year level but also differs between subjects (latest version MSW, 2016). For example, in the school year 2015/16 about 3.1% of the EFL lessons at *Gymnasien* and 18% at *Gesamtschulen* were taught out-of-field. These school types are comparable to High schools and provide the chance to enter university after 12 or 13 years. At schools that provide education only from year 5 to 10 teaching out-of-field occurs more often. For EFL the proportion of EFL lessons taught out-of-field ranges from 15% to 43.3% (MSW, 2016, p. 114–116). Official data on the number of teachers teaching out-of-field in higher secondary or tertiary education are not known. To sum up, the incidence of teaching out-of-field in Germany differs between subjects but also between school grades and school types and can be regarded as a substantial number.

### ***3.3.6 Responses at national, state or local levels***

Studies into teaching out-of-field and its consequences are relatively new in Germany and have only played a marginal role in the German research context. Discussions regarding how to handle the phenomenon of teaching out-of-field were mainly instigated by the publications of Törner & Törner (2012) with respect to the subject mathematics. The phenomenon was regarded as a taboo subject in Germany (Törner & Törner, 2012). Since then a growing number of research studies on the effects on students' proficiency (e.g., Klusmann & Richter, 2014) or on teachers' identity (Bosse, 2016) have been conducted. Moreover, trainings for professional development targeted at teaching out-of-field teachers are offered in some German states. Accompanied by intensive research are courses by the *German Centre for Mathematics Teacher Education (DZLM)* that is addressing the needs of teaching out-of-field mathematics teachers. It should be noted that these courses have been initiated by the university sector rather than being driven by government. Within an IQB-cooperative study for the first time research into teaching out-of-field is being discussed in particular whether out-of-field-teaching is leading to a restricted competence for the students. Richter et al.'s (2012, 2013) study found that this was the case and thus the phenomenon has gained momentum within educational research in Germany for the first time.

Despite these university and researcher led initiatives to address the potential problems caused by out-of-field teaching, while the phenomenon remains an expedient solution to teacher shortages in mathematics, science and other subject any coherent system level initiatives to handle out-of-field teaching are potentially limited.

## **3.4 Indonesia**

### ***3.4.1 Education system***

According to Law 20/2003 on the National Education System, the Indonesian Education System is organized into three paths: formal (conducted in schools), non-formal (out-of-school education) and informal education (education within the family and community). The national formal education system consists of basic, secondary and tertiary education. Basic education consists of 6 years in elementary school and 3 years in junior secondary school. Senior secondary school consists of general and vocational senior secondary schools.

As it is shown in Table 3.1, there are general school and Islamic school. The Ministry of Education and Culture (MOEC) supervises the general schools, while

Ministry of Religious Affairs (MORA) has responsibility to supervise the Islamic schools.

**Table 3.1.** Education system in Malaysia

Age	School/Education Level				Out-of-school Education		
					Non-formal	Informal	
>22	Post Graduate/Islamic Post Graduate				Courses	Family Education	
19-22	Higher Education/Islamic Higher Education						
16-18	Senior Secondary School						Apprenticeship
	General		Vocational				
	General Senior Secondary School	Islamic General Senior Secondary School	Vocational Senior Secondary School	Islamic Vocational Secondary School			
13-15	Junior Secondary School		Islamic Junior Secondary School		Packet C		
7-12	Primary School		Islamic Primary School		Packet B		
4-6	Kindergarten		Islamic Kindergarten		Packet A		
0-3					Play Group		
					Day care center		

Source: Shah, M., Bennett, A., & Southgate, E. (2015).

### 3.4.2 Teacher education and certification

In the Indonesian language a teacher is called *guru*. In Javanese, a *guru* is someone who must be *digugu* (obeyed) and *ditiru* (as a role-model). Yet, one of the famous Indonesian artists once wrote a song, entitled Oemar Bakrie, to describe the teachers' condition in Indonesia. In this song, he depicted an Indonesian teacher, called Oemar Bakrie, who is a loyal civil servant, who has been a teacher for more than 40 years, a humble man who goes to school by his cycle, his students become ministers, professors, doctors and he is underpaid. The Law No.14 of 2005 on Teachers and Lecturers passed and changed this condition. Based on this law, the teachers, who have been certified, earn increased salary. The World Bank report (2015) clearly stated that the certification doubled a teachers' take home pay. However, the report also highlighted that after a decade of the enactment of the law, the increased teacher's salary did not lead to substantial improvement in student-

learning outcomes. Numbers of teacher by academic qualification and status in Indonesia are listed in Table 3.2.

**Table 3.2.** Numbers of teachers by academic qualification in Malaysia

School Level	Academic Qualification							Total
	<= Senior High School	D1	D2	D3	Bachelor	Master Degree	Ph.D	
<b>Kindergarten</b>	<b>110,742</b>	<b>9,440</b>	<b>32,382</b>	<b>3,097</b>	<b>18,657</b>	<b>115</b>	<b>1</b>	<b>174,429</b>
Civil servant	19,977	770	5,955	336	5134	63	-	32,235
Non civil servant	90,765	8670	26,427	2761	13,518	52	1	142,194
<b>Elementary school</b>	<b>417,389</b>	<b>11,529</b>	<b>589,034</b>	<b>23,841</b>	<b>207,074</b>	<b>1,161</b>	<b>4</b>	<b>1,250,032</b>
Civil servant	266,331	7,213	505,119	15,328	152,090	1,077	2	947,160
Non civil servant	151,058	4,316	83,915	8,513	54,984	84	2	302,872
<b>Junior High School</b>	<b>39,133</b>	<b>36,202</b>	<b>37,446</b>	<b>72,822</b>	<b>299,319</b>	<b>3,277</b>	<b>7</b>	<b>488,206</b>
Civil servant	16,060	29,327	25,785	51,441	164,388	2,870	4	289,875
Non civil servant	23,073	6,875	11,661	21,381	134,931	407	3	198,331
<b>Special Needs</b>	<b>1,666</b>	<b>238</b>	<b>2,883</b>	<b>803</b>	<b>4,514</b>	<b>50</b>	<b>-</b>	<b>10,154</b>
Civil servant	577	68	1,839	505	2,644	42	-	5,675
Non-civil servant	1,089	170	1,044	298	1,870	8	-	4,479
<b>Senior High School</b>	<b>6,301</b>	<b>1,200</b>	<b>4,082</b>	<b>22,964</b>	<b>189,753</b>	<b>3,106</b>	<b>27</b>	<b>227,433</b>
Civil servant	2,056	345	2,071	13,853	101,752	2,436	5	122,518

Non civil servant	4,245	855	2,011	9,111	88,001	670	22	104,915
<b>Vocational School</b>	<b>5,172</b>	<b>1,341</b>	<b>2,842</b>	<b>23,942</b>	<b>120,764</b>	<b>1,691</b>	<b>9</b>	<b>155,761</b>
Civil servant	900	230	834	9,429	40,282	1,054	3	52,732
Non civil servant	4,272	1,111	2,008	14,513	80,482	637	6	103,029
<b>Primary Islamic schools</b>	<b>94,755</b>	<b>23,580</b>	<b>45,933</b>	<b>9,086</b>	<b>31,312</b>	<b>108</b>	<b>-</b>	<b>204,774</b>
Civil servant	4,478	4,480	18,267	2,358	6,997	45		36,625
Non civil servant	90,277	19,100	27,666	6,728	24,315	63		168,149

**Source:** Jalal, F., Samani, M., Chang, M. C., Stevenson, R., Ragatz, A. B., & Negara, S. D. (2009).

According to the World Bank Report (2015) there is an oversupply of teachers as the teacher training colleges produce 250,000 university trained teachers each year, while the school system needs only 50,000 – 100,000. In addition, UNESCO (2015) stated that there is an uneven distribution of teachers, with an oversupply in urban areas and shortages in very remote locations.

### ***3.4.3 Terminology used for teaching out-of-field***

Teaching out-of-field is known as nonlinearity in Indonesia. According to the Minister of Education and Culture Regulation No.46 of 2016, the nonlinearity is between teachers' certifications and the subject they teach. Before the enactment of the new regulation in 2016, the former Minister of Education and Head of Cooperation at the Ministry of Education and Culture called teaching out-of-field as mismatch, which was defined as the unsuitability between the teachers' education background and the subject they teach (Zakaria, 2012; Nuh, 2013). Currently, scholars in Indonesia often use both nonlinearity and mismatch interchangeably to denote teaching out-of-field.



### ***3.4.4 Teacher assignment policies and practices***

According to the Education Law 20/2003, lower government is responsible for the principle responsibilities, authority and resources for delivery of education. This responsibility comes with significant decision-making power being transferred to schools themselves. Local education offices are now playing a much more significant role in planning, implementing and monitoring the delivery of education services. Decentralisation has given authority to schools and community members to participate more in local education decision-making. Ministerial Regulation 44/2002 mandated the School-based management (SBM) which assigns responsibilities – such as school planning and budgeting, staff management and curriculum development – to principals and school committees (Tobias et al., 2014).

### ***3.4.5 Reporting and incidence or teaching out-of-field***

Although teaching out-of-field has attracted considerable attention from the Ministry of Education and Culture, current data on teaching out-of-field is not available in any official statistics or anecdotal evidence. The most updated data was provided by Zakaria (2012) in his article published in the Education and Culture Journal – Ministry of Education and Culture, in which he noted that from 33 provinces in Indonesia, 21% elementary school classroom teachers (homeroom) are out-of-field and 54% of religion teachers nationwide are out-of-field. This data was taken in 2012.

### ***3.4.6 Responses at national, state or local level***

Several teacher reforms have been implemented. In 2003, the government issued Education Law, followed by Teacher Law in 2005 when teacher certification was implemented, teachers' salary doubled and the education bar set higher (4-year degree). Many regulations were issued for both pre-service and in-service teachers including teachers' linearity between the certification and the subject they teach in 2016. It is believed that the Ministry of Education and Culture has monitored all of the implemented policies and conducted evaluations but the Ministry does not publish the results of its monitoring and evaluation to the public. Such information is important as transparency to the public regarding the effectiveness of the government policy.

## **3.5 Ireland**

### ***3.5.1 Education System***

Schooling in Ireland is compulsory from the ages of 6-16. Children begin primary school at age 5 approximately and undertake 8 years of schooling. They then enter secondary school at age 12 approximately where they undertake 5-6 years of school. Post-primary education in Ireland is broken down into the Junior Certificate (lower secondary, years 1-3) and the Leaving Certificate (upper secondary, years 5-6). An optional Year 4 – Transition Year – exists between the Junior and Leaving Certificate. The Irish post-primary education system operates on a centralised education model and contains very prescriptive syllabi, with a state examination after year three and year 6. State examination of the Leaving Certificate dictates entry into further and tertiary education. The vast majority of primary and post-primary schools in Ireland are public and state funded (Coolahan, 2015).

### ***3.5.2 Teacher education and certification***

The teaching professional in Ireland is held in high esteem and school leavers who go into the teaching profession are amongst the top 15% of academic achievers at school level (Hyland, 2012). In much of the policy documentation in the nineties, the government commended the work of teachers, acknowledged the importance of their roles and set out a proposal in which teaching careers could be supported. Since 2012 teaching is an all graduate career, and given its relatively high salaries and status, it continues to attract high quality entrants to the teaching force (Coolahan, 2015). Teachers teaching at primary level need to complete a specialist primary teaching degree/postgraduate programme and are teachers of all subject areas (no subject specialism exists at primary level in Ireland). Post-primary teachers have to complete degree level studies in their specific subject area(s) and complete a specialist post-primary teaching qualification.

### ***3.5.3 Terminology used for teaching out-of-field***

The Teaching Council of Ireland has defined teaching out-of-field in its 2011 report, *Policy on the Continuum of Teacher Education* report, “Teachers teaching a subject in respect of which their qualifications do not meet the subject-specific criteria set down by the Teaching Council for registration purposes” (Teaching Council, 2011, p. 5).

### ***3.5.4 Teacher assignment policies and practices***

In theory, the teaching profession in Ireland is governed by the Teaching Council. In practice however, the Teaching Council has greater control over the regulation of initial teacher education and registration than on in-service teaching and school governance arrangements. Deployment of teachers and timetabling lies with individual school principals.

### ***3.5.5 Reporting and Incidences of teaching out-of-field***

Constraints such as teacher quotas, subject offerings, location and contractual issues have led to out-of-field teaching occurring at the post-primary level in Ireland. Like many countries worldwide, the phenomenon of out-of-field teaching in Ireland has not been characterised extensively in education literature. Only mathematics teaching at post-primary level has been examined. One relatively early study found that 28% of teachers teaching mathematics, within schools partaking in a PISA study, were qualified in disciplines which did not include mathematics as a major component (Cosgrove et al., 2004). A Royal Irish Academy (2008) report estimated that 80% of teachers teaching mathematics in Ireland were unqualified to do so. However, a clear need emerged for evidence-based research analyses to be conducted on the level and impact of out-of-field mathematics teaching in the Irish post-primary context, rather than relying on ‘soft’ or anecdotal evidence up to that point. Accordingly, a national quantitative study was undertaken to establish a factual basis for further research into mathematics teacher education (Ní Ríordáin & Hannigan, 2009). One of the significant findings emerging from the research was that nearly half (48%) of teachers teaching mathematics were not specifically qualified to do so. The qualified mathematics teachers were predominantly assigned the state examination years (year 3 and year 6) and upper secondary mathematics classes. Out-of-field teachers were predominantly deployed in the non-exam years and with less academically able (Foundation and Ordinary level mathematics) and younger (year 1 and year 2) students. There was also cause for concern given that a considerable number (63%) of these out-of-field teachers felt suitably qualified to teach mathematics even though their degrees and postgraduate qualifications do not contain sufficient mathematics.

### ***3.5.6 Responses at a national, state or local level***

To improve the quality of mathematics teaching and to support practicing teachers, CPD opportunities were considered an immediate priority by the Government.

Accordingly a Professional Diploma in Mathematics for Teaching (PDMT) was developed as a blended-learning, national programme designed to develop out-of-field teachers' content and pedagogical knowledge through 60 credits of mathematics and 15 credits of mathematics pedagogy related material. The first intake into this programme was in Sept. 2012. Applicants to the PDMT must meet the following criteria in order to be considered for a place on it, teachers must be:

- currently teaching mathematics in a post-primary school in Ireland;
- a qualified, post-primary teacher in a discipline other than mathematics; and
- registered with the Teaching Council.

In terms of academic eligibility, there is no specific mathematics requirement for the programme. However, there is an expectation that the teachers applying have mathematics to a standard which is beyond second level, i.e., an expectation that they have studied some undergraduate mathematics.

Several research projects are currently being undertaken in an attempt to evaluate the effectiveness of the PDMT from a number of theoretical perspectives. For example, examinations into teachers' subject and pedagogical content knowledge before and after undertaking the course has been carried out, in conjunction with a doctoral study examining teacher identity after undertaking the course. These findings, along with more extensive details regarding how the PDMT is co-ordinated and run, can be found in chapter 5 and chapter 11. Although the programme may be considered to be in its infancy, it provides a format and key insights for professional development in an international context, which have not been documented up to this point.

## **3.6. United Kingdom**

### ***1.6.1 Education system***

The school system in England is directed centrally by the Department for Education, which sets educational standards and regulations.

Children between the ages of 3 and 5 are entitled to 600 hours per year of optional, state-funded, pre-school education. Full time education in England, UK is compulsory; it begins at age 5 through to age 16. After age 16, young adults are required to continue their full time education. The age at which a student may choose to stop education is commonly known as the "leaving age" for compulsory education and this age was raised to 18 by the Education and Skills Act 2008. Most students move from primary to secondary school at age 11. Many secondary schools offer education for students until age 18; however, students may choose to enter a

Sixth Form or Further Education (FE) college, apprenticeship, or traineeship at age 16 where they will stay in full time education until the age 18.

Schools in England are state funded or private (independent). State funded schools include maintained schools, voluntary aided schools (which are mostly of a religious nature), academies, and free schools. Higher education in England is provided by Higher Education (HE) colleges, university colleges, universities and private colleges. Students normally enter higher education as undergraduates from age 18 onwards, and can study for a wide variety of vocational and academic qualifications.

### ***3.6.2 Teacher education and certification***

Teaching is a graduate profession into which there are two main routes: (i) university programmes of study and (ii) in-school training.

University programmes of study offer teacher training courses for both undergraduates and postgraduates as:

- a three year or four year undergraduate degree, combining the study of one or more academic subjects with professional training in aspects of education) and
- the Postgraduate Certificate in Education (PGCE).

The PGCE route is a popular route for secondary school teachers, and most have a subject specialization based on their first degree (<https://www.prospects.ac.uk/postgraduate-study/teacher-training/routes-into-teaching> last accessed 19th Feb 2017). Both university routes involve trainee teachers spending significant blocks of time in school classrooms under the supervision of practicing teachers (in-school subject mentors).

Across England there are school-led training options for graduates who want hands-on training in a school such as School Direct and Teach First and School-centred initial teacher training (<https://www.prospects.ac.uk/postgraduate-study/teacher-training/routes-into-teaching> last accessed 19th Feb 2017).

If applying for teacher training in a priority subject (biology, geography, mathematics, physics, chemistry, computing, design and technology, or a language) applicants who need to acquire more subject knowledge in these subjects may still be able to train to teach these subjects (and be eligible for the bursaries they attract) by building up or refreshing your existing knowledge with a subject knowledge enhancement (SKE) programme. SKE programmes are available all over England at universities, schools, or third parties. They can be completed before, or alongside some or all of the teacher training and are available full-time or part-time, classroom-based or on-line. Most people do a short course lasting 8 -12 weeks immediately before the start of their training course. SKE courses are designed to bring

participants subject knowledge up to the appropriate standard needed to teach at secondary level.

### ***3.6.3 Terminology used for teaching out-of-field***

In England, a ‘specialist mathematics teacher’ is a teacher with Qualified Teacher Status, who has a relevant post A level qualification where ‘A level’ is the standard university entrance requirement for university entrance.

### ***3.6.4 Teacher assignment policies and practices***

Regardless of the training route they follow, all trainee teachers must meet the Teachers’ Standards (Department for Education, 2013) at an appropriate level before the Qualified Teacher Status (QTS) can be awarded. QTS is needed by teachers to work in all maintained school, and may also be required by some independent schools, academies and free schools. The Teachers’ Standards are set by the Secretary of State, and also are used to assess teachers’ performance following their training as part of the annual appraisal process. Following their formal training, teachers start their careers as Newly Qualified Teachers (NQTs) with QTS. They are supported by in-school mentors and are assessed against a set of national standards during a statutory 12-month induction program. This model is designed to link initial teacher education and practical effective professional practice.

### ***3.6.5 Reporting and incidence of teaching out-of-field in England: the case of mathematics***

The demand for mathematics teachers in England has out stripped supply: of mathematics lessons in state schools in England in November 2012, 18% were taught by non-specialists, indicating a shortfall of 5,500 ‘specialist mathematics teachers’ (Hillman, 2014, p. 23), and this shortfall of 18% is also reported in the 2014 government statistics. The 2015 statistics on teacher supply in England gathered by the Department for Education revealed “79.8 per cent of mathematics lessons taught to pupils in year groups 7-13 were taught by teachers with a relevant qualification; a decrease from 82.7 per cent in 2013” and “75.8 per cent of teachers of mathematics to year groups 7-13 held a relevant post A level qualification (down from 77.6 per cent in 2013)” (Ross, 2015, p. 13). The shortage of specialist mathematics teachers continues to be an issue for secondary schools in England.

### ***3.6.6 Responses at national, state or local levels***

To improve the quality of mathematics teaching and to support practicing teachers, CPD opportunities were considered an immediate priority by the Government. One such CPD opportunity was the *Mathematics Development Programme for Teachers* (MDPT) launched by the Teacher Development Agency (TDA) in 2009. This course was for secondary school teachers who aimed to improve their knowledge of mathematics along with their pedagogical skills in mathematics teaching yet do not have a post A-level mathematics qualification nor an initial teacher training mathematics specialism. To be enrolled on such a programme, the teachers needed to also be supported in their application by their current Head Teacher, who needed to ensure that the participants had mathematics teaching on their timetable during the training year and the following year.

The successful applicants had to be from schools that provide education for pupils within Years 7 to 11 (11 to 16 years old) of secondary school education, had to have some mathematics teaching experience and had to have completed their teacher training, had to have achieved their QTS as well as completed their NQT year. To be eligible to enrol on an MDPT course, teachers had to satisfy these two criteria: 1. their degree that qualified them for QTS should not have not 'mathematics' (or 'mathematical sciences' or similar) as part of the degree subject title; 2. they had not undertaken initial teacher education (ITE) in secondary school level mathematics.

The course tuition fees were fully funded by the TDA for teachers from maintained schools, special schools and academies. Teachers from independent schools and further education colleges had to pay a fee of £4000. TDA also provided supply cover funding for teachers funded by them for days of the course that took place in school-time. Each school was under obligation to provide evidence to show that supply cover costs have been incurred and would be able to claim for these costs (up to a maximum of £150 per day). Each school was expected to provide a suitable mentor for the teacher, such as an experienced member of the mathematics department.

There were two elements of the summative assessment for this programme: a required structured portfolio assessed at 60 H-level credits and an optional essay assessed at 30 M-level credits. In the event that a participant attended and participated in the course but had not successfully completed the MDPT, the participant received a certificate of attendance.

The first intake into this programme was in Sept 2009. A participant was eligible for a financial incentive of £5,000 at the end of the course provided that he or she had: 1. successfully completed the course, gaining the H Level credits; 2. had 80% attendance rate or better; 3. had confirmation from their Head Teacher that they would be teaching the subject in a maintained secondary school, special school or academy in England after the conclusion of the course. In terms of academic eligibility, this course was for secondary school teachers who aimed to improve their

knowledge of mathematics along with their pedagogical skills in mathematics teaching yet do not have a post A-level mathematics qualification nor an initial teacher training mathematics specialism.

The MDPT course run by UCL Institute of Education, University College London (Crisan & Rodd, 2011), was one of eight similar national courses. It aimed to provide professional development for teachers who had the aspiration to enhance their subject and pedagogical knowledge in mathematics and to become confident and competent teachers of secondary mathematics. The findings of research undertaken by Crisan and Rodd (2011, 2014) alongside this programme, along with more extensive details regarding how the MDPT was co-ordinated and run, can be found in chapter 5 and chapter 11.

In 2011, in England, the MDPT course described above was decommissioned and replaced by a cheaper-to-run 20 day subject knowledge enhancement course for non-specialist teachers. In England, Crisan and Rodd (2014) introduced the term non-specialist teachers of mathematics. These courses shared many of the MDPT programme design features, with the exception of the school based element, and implications for assessment approaches.

In 2015, the National College for Teaching and Leadership in England launched another initiative to address the shortage of teachers of mathematics and physics in England, UK: the Training Subject Specialist Teachers (TSST) aimed at improving the mathematics and physics subject knowledge of non-specialist teachers and those teachers looking to return to the profession and increase the number of hours taught, by offering school-led teacher subject specialism training opportunities. The aim is for a total of 15,000 participants to have undertaken the training by July 2020, at no financial cost to the participant. The TSST programmes follow a school-led model where lead schools design and deliver TSST in secondary mathematics and/or physics to meet local and regional needs.

Teachers eligible for TSST include: (i) Non-specialist teachers who are currently teaching mathematics or physics (either full-time or in addition to the specialist subject) (ii) teachers whose specialism is not mathematics or physics, but who could potentially teach mathematics or physics in addition to their main subject; (iii) teachers who want to retrain as mathematics or physics teachers; (iv) teachers wishing to return to the profession who need to update their subject specialism knowledge.



## **3.7 USA**

### ***3.7.1 Education system***

Students in the United States can attend public schools or private schools, with most students attending public schools. Most of the funding and oversight of the public schools is the responsibility of the state/local government, and not the federal government. Property taxes are a major source of school funding. This oversight of schools includes the standards that will be taught to students and the assessment of student learning. The qualifications of teachers and the process by which they are evaluated is also guided by state/local policies. Within each state, there are school districts that contain elementary schools (Kindergarten - 5th/6th grade), middle schools (6th-8th grades), or high schools (9th-12th grade). Most districts contain schools that range from elementary to high school.

### ***3.7.2 Teacher education and certification***

In the US, there are many different paths and ways to complete an initial teaching certificate. The two broad areas are traditional and alternative routes, and again – there is significant variation within these routes. The most common traditional routes consist of acquiring a teaching certificate from the state after the completion of a four-year Bachelor of Science in Education (BSEd) program or a five-year combined BSEd and Masters of Arts in Teaching (MAT) program. These programs have coursework in the field of education, specified work in classrooms, and often involve higher education faculty as instructors. Upon completion of the coursework, which aligns with state policies for teacher certification, potential teachers often take various exams and are recommended by the institution for their certificate in teaching. With adequate scores and a good recommendation, potential teachers receive their teaching certificate.

Alternative programs can vary from virtually no teacher preparation coursework, to a two-year MAT program following an undergraduate degree in a subject area. These programs differ from traditional programs in the composition and sequencing of the coursework, and they often have a variety of people involved in the instruction of the course. Alternative certification programs were developed in order to increase the number of teachers in the US system, and to explore different paths towards teaching. Alternative certification programs still have to comply with state policies. However, the policies are addressed in different ways. For instance, most states require student teaching, which is a period of time in a classroom under the guidance of a mentor. In an alternative route, student teaching may not exist, and the new teacher may just have weekly meetings with a mentor to discuss his or her

teaching. In the alternative certification route, a teaching certificate is earned when the probationary period of teaching has been completed and various state requirements have been met.

In the US, these different certification routes and each states' own scope and sequence for teacher certification contributes to uneven knowledge thresholds among teachers (National Council on Teacher Quality, 2010). For instance, in the area of science, many state policies do not adequately determine if teachers have mastered the content they are teaching. Instead, some states have a general content area certificate, which is a collection of courses that count as content expertise. According to the National Council of Teacher Quality (2010), "all but 11 states allow secondary science teachers to obtain general-science certifications or combination licenses across multiple science disciplines (pg. 1)."

General certificates are a problem for a teacher can be assessed as '*highly qualified*,' but have no deep understanding of the field. For instance, middle school science teachers, who have a general certificate, may be teaching courses in which they have only a course or two in each content area. In Georgia, for example, a 7<sup>th</sup> grade science teacher who is 'highly qualified' in *general science* will teach biology, physics, chemistry, and earth science. If this teacher completed a K-8 certification program at a major university, he/she may only have two or three courses in science. Even though the initial certification program complies with the guidelines for 'highly qualified' at the state policy, the degree may not adequately prepare a middle school teacher to teach science. As a result, a teacher with a general certificate, which is most often a middle school teacher, can be assigned to teach any number of classes that are outside of his or her expertise.

The problem of out-of-field teaching is not just found among middle level teachers; it also occurs at the high school level. High school teachers certainly have more subject matter coursework than their K-8 counterparts. Typical degrees consist of a major in a discipline, with supporting content from other similar areas. In the sciences, for example, biology majors often take a few courses in chemistry and physics, while chemistry majors may take a few courses in physics. While these teachers certainly are qualified in their primary discipline, the curriculum of the school may be at odds with their preparation. For instance, in some states, 9<sup>th</sup> grade students take an introductory course that is called Physical Science. This course has elements of both physics and chemistry. While the content is certainly basic, finding a teacher who is 'highly qualified' in both chemistry and physics is difficult.

The problem of out-of-field teaching also occurs in schools in remote locations or in high poverty settings. These schools do not attract a significant number of teachers, and often experienced teachers are required to teach courses in which they have do not have adequate content knowledge.

### ***3.7.3 Terminology used for teaching out-of-field***

Even though policymakers require that teachers be ‘highly qualified teachers’ (see No Child Left Behind Act of 2001 (NCLB), different variations of ‘highly qualified’ have emerged over the year that take into account the supply of teachers in a specific location. This problem in the US has been discussed by Ingersoll (e.g., 1998, 1999).

### ***3.7.4 Reporting and incidence of teaching out-of-field***

In order to understand if ‘out-of-field’ teaching was a problem among newly hired science teachers, Luft, Hill, Weeks, and Raven (2013) completed an analysis pertaining to collected beginning science teacher data. This data came from two NSF funded studies that followed 100 secondary science teachers from 2005-2010 (in the time of NCLB). Approximately half of the teachers were in middle school and half were in high school. This data included the instructional practices (activity and topic) of the science teachers, which consisted of approximately 40 daily lessons per teacher, per year. This is approximately 5 days of lessons per month. This data was examined with attention given to the teacher’s declared content major.

The analysis examined the percentage of time that new secondary science teachers were teaching outside of their content major during their first two years of teaching. To do this analysis, a research assistant coded the teachers’ degree major (e.g., biology, chemistry), the socio-economic status of the teacher’s school, as well as the setting (e.g., urban) of the school.

Using the teacher’s major as the indicator for teaching in-field or out-of-field, the teacher’s instruction was coded as in-field (consistent with the major) or out-of-field (inconsistent with the major) during each day of recorded instructional practice data. The results from this simple analysis were surprising. Specifically, when major was linked to the instructional data, more than 50% of the science teachers were teaching out-of-field between 60-100% of the time during *all* eight weeks of their first (N=128) or second year (N=103) (Figure 1). Additional analyses revealed that 60% of the middle school teachers were out-of-field more than 50% of the time, as were teachers in urban and predominately low socio-economic settings. Finally, there was no difference in the amount of time that science teachers were out-of-field from the first to the second year. That is, a newly hired science teacher was just as likely to be teaching out-of-field in the second year as in his/her first year.

### ***3.7.5 Responses at the national, state or local levels***

As new standards (e.g., the *Next Generation Science Standards*, [Achieve, 2013]) and new teacher evaluation policies begin to take hold in the US, the subject matter knowledge of a teacher will take on renewed importance. New standards direct teachers towards interdisciplinary ideas and require a depth of knowledge. Emerging teacher evaluation policies will result in assessments of teacher quality, which will link back to the teacher's preparation and certification institution. If a teacher does not fare well on the assessment, his/her credentialing institution will be potentially held accountable. With both of these wide-reaching changes, understanding the connection of teacher preparation to the first years of teaching will be important. In addition, it will be important to understand how out-of-field teaching is manifested in this emerging political climate.

## **3.8 Discussion**

The vignettes included in this chapter from six countries highlight the complexity of the phenomenon of teaching out-of-field. The way in which education systems are structured, the nature of the curriculum and how traditional subjects are divided, teacher education and certification requirements and beliefs about the nature of teachers' knowledge and work (e.g., content vs pedagogical knowledge) vary within and across nation states. The vignettes provide readers with a transnational perspective on these complexities which inevitably will enhance understandings about the phenomenon beyond narrow local and culturally specific parameters. Importantly they also provide opportunities to see how various countries have responded to the phenomenon from which local jurisdictions can gain valuable lessons.

Clearly in all six countries a significant number of teachers have been identified either by researchers or government reports as teaching out-of-field but the extent is difficult to accurately measure for a number of reasons. Whether a teacher is considered officially or anecdotally as teaching out-of-field is dependent on what it means to be qualified to teach a particular subject or year level. Qualifications vary within jurisdictions and can change according to legislative requirements. In most cases though it is assumed that in order to be qualified to teach a subject a teacher would have studied at the very least one or two units of the subject content at a tertiary level. In most cases there is also a requirement for some pedagogical training in that subject. The way in which these two elements of teachers' knowledge (that is content knowledge of a subject and knowledge of how to teach it) are weighted within teacher education programs and teacher certification requirements reflects dominant views about teaching and learning and the nature of teachers' work. This much debated and critically important theme is further explored in Chapter 5.

Secondly, the vignettes demonstrate the complexities in delineating what “counts” as teaching out-of-field and this varies within jurisdictions and across national borders. These complexities accordingly impact on the adequacy of empirical data on teaching out-of-field and thus require a nuanced approach to such data. The data can be complicated by, for example, the inclusion of generalist primary school teachers who are unlikely to have formal qualifications to teach all subjects in the curriculum. A further complicating factor can be the variety that exists within broad subject categories such as Science (which can include physics, chemistry, biology etc.) or Social Sciences (often made up of history, geography, economics, politics etc.). So, for example, a science teacher may have a tertiary degree in biology but is required to teach chemistry in a subject called general science. This draws attention to long held and dominant views that differentiate subjects not just based on the content but also to a whole range of differing key concepts, modes of inquiry, and discursive practices that vary from one subject to another and even within broad subject categories such as physics and chemistry or history and economics in a traditional school curriculum. In Chapter 6 the implications of such subject specific demands on teaching out-of-field teachers are explored both in terms of the challenges and the possibilities for cross fertilization of modes of inquiry.

Thirdly, while the official reporting of teaching out-of-field is complicated by the factors articulated above as well as a reluctance in some cases to acknowledge its existence, the evidence here clearly suggests teaching out-of-field exists to varying degrees in all countries and can be up to a staggering 50% or more in some subjects or schools. A consistency across all the vignettes is that while national or state government authorities publicly make claims that teachers should be qualified to teach specific subjects or year levels and various measures such as certification requirements are in place, the actual assignment of teachers to classes largely remains at the discretion of principals who are required assign a teacher to every class. Where teacher shortages exist the use of out-of-field teachers is a means to address this. Critical questions about who is responsible for teacher certification and assignments are raised in Chapter 8. Clearly a gap exists between official pronouncements about subject specific teacher qualifications and certification and their links to teacher quality are called into question by the existence of teaching out-of-field.

Fourthly, a concerning pattern raised in the vignettes is that most often teaching out-of-field occurs in rural, remote or low SES schools. Also, teaching out-of-field teachers, as is reportedly the case in all the vignettes are more likely to be assigned to lower years, non-exam years or less academically able students. Similarly, teaching out-of-field teachers are more likely to be Early Career teachers in their first or second years. The vignettes provide insights into some of the distinctive characteristics of teaching out-of-field teachers and the school environments in which they often work. Such knowledge is invaluable in the development of appropriate strategies to support the specific needs of teaching out-of-field teachers. These strategies include attention to the phenomenon within pre service teacher education programmes, Teacher Professional Learning opportunities and localized school based support. Such possibilities are further explored in Chapters 9, 10 and 11.

Finally a key theme that has emerged for the vignettes has been that responses to teaching out-of-field have increasingly been to develop professional development programmes for teachers to improve their content and or pedagogical skills to teach subjects for which they do not have formal qualifications. Such professional development programmes vary widely in length and scope from one day short courses to 1-2 year Certificate or Diploma level courses. A range of professional learning models that have recently been developed are examined in Chapter 11.

### 3.9 Conclusion

Increasing shifts toward more rigorous teacher certification requirements including on-going teacher appraisal systems, linked to promotion or pay in the USA, UK and Australia, for example, aim to monitor and control the qualifications required of teachers. These requirements have implications for Out-of-field Teachers. Ongoing international debates about what constitutes quality teaching and the nature of teachers' work are also significant in considering the way in which out-of-field is conceptualized, reported on and addressed. The vignettes included in this chapter help to provide an understanding of the phenomenon of teaching out-of-field as it exists in six countries enabling researchers, educators and policy makers a view from an international perspective. Further research into the impact of teaching out-of-field on student learning is required. This was not dealt with in these vignettes as it is an emerging area of study and the focus of Chapter 7 based on TIMMS and PISA data. The vignettes have provided an introduction to the phenomenon of out-of-field teaching as it currently exists across a range of international settings and from the perspective of those teaching and researching in the field. The vignettes have formed the basis of relevant issues that are explored in more detail subsequent chapters.

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