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# Developing potentiality: pre-service elementary teachers as learners of language immersion teaching

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## ABSTRACT

Research has shown immersion to be effective, yet our understanding about the integration of language and content in Irish-medium immersion (IMI) pedagogy remains incomplete. This article reports on how the teaching of mathematics in the IMI elementary setting, supported pre-service teachers in bridging the language and content gap. The study utilised Japanese Lesson Study (LS) to design and implement mathematics lessons and qualitative data were collected from a variety of sources. Findings provide unique insights into the knowledge demands related to designing and implementing content lessons and reveal the challenges for pre-service teachers in providing balanced language and content instruction.

## ARTICLE HISTORY

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initial teacher education (ITE);  
elementary education

## Introduction

Irish, or *Gaeilge*, is an autochthonous (indigenous) language spoken in the Republic of Ireland and in Northern Ireland. Even though the renewal of the Irish language has been a significant focus for successive governments since the foundation of the Irish Free State in 1922, it is clear that the status of the Irish language as a community language in the Gaeltacht (Irish-speaking regions) is increasingly under threat (Mac Donnacha et al. 2005; Ó Flatharta 2007; Ó Giollagáin et al. 2007). Teacher development is viewed as a foundation stone in the process of renewal given ‘the critical importance of the school in influencing language awareness and behaviour – as well as in the wider society, in highlighting the cultural value and importance of Irish to the Irish people’ (Government of Ireland 2010, 10). Irish-medium immersion (IMI) has a significant role to play in reversing language shift.

IMI education is normally provided to students for whom Irish is not their first language (L1) in schools outside the *Gaeltacht* regions, known as *Gaelscoileanna*. Currently 7.5% of elementary school children attend one of the 144 IMI schools in the Republic of Ireland (Kavanagh 2014). The goal of IMI is bilingualism and biliteracy as well as expansion of the minority language and culture into the community and nationally. The majority of IMI schools employ an ‘early total immersion’ model, i.e. on entering the IMI setting, students are immersed in the Irish language in a motivating and meaningful social context (Ní Mhaoláin 2005). With the exception of the Irish language, the IMI curriculum parallels the local English-medium curriculum. Teachers in IMI settings are fully proficient in both Irish (i.e. the medium of instruction) and English (i.e. the students’ L1) and students have little or no exposure to the Irish language outside of the classroom environment.

There are two distinct differences between immersion schools in the Republic of Ireland and immersion schools in other jurisdictions. Firstly, IMI schools are not immersion tracks, streams or

units within English-medium schools but are whole-school immersion centres. Secondly, while the formal introduction of English instruction is delayed in infant (kindergarten) classes, once English instruction commences, it accounts for almost 14% of the school day from 1st to 6th grade. In contrast to other countries e.g. USA, where in immersion settings the proportion of instructional time typically decreases to 50% by grade 6 (Genesee and Jared 2008; Lenker and Rhodes 2007), this is not the case in IMI elementary schools as all subjects besides English are taught through the medium of Irish until the end of 6th grade.

### ***The reality of elementary teaching***

While many factors have been found to affect student learning, there is consensus that teachers are the most significant resource in efforts to improve education i.e. high quality teaching is vital to improving student learning (Organisation for Economic Cooperation and Development (OECD) 2005; Training and Development Agency for Schools (TDA) 2008). Teacher preparation and development are therefore critical.

Initial teacher education is probably the single most important factor in having a well-performing public education system. Evidence from the OECD countries is consistent with this notion. Singapore, Korea, Canada and Finland, countries that the OECD labels as having 'strong performing' education systems, have systematically invested in enhancing the initial education of their teachers (Sahlberg 2012, 5).

In order to address the complexities of teaching, teachers require appropriate skills, knowledge, attitudes and practice (Conference Board of the Mathematical Sciences [CBMS] 2001; OECD 2005). These demands are multiplied for elementary teachers who assume the role of global teachers and they teach all the subjects in the elementary curriculum. While it is not expected that they are experts in every curricular area (Ng 2011), there is an assumption that teachers should possess appropriate knowledge of each in order to be able to anticipate and respond to pupils' approaches and misunderstandings (Department of Education and Science 2002; Grossman, Schoenfeld, and Lee 2005).

### ***Elementary teaching in an immersion setting***

Immersion teachers are professionally charged with promoting academic achievement while simultaneously ensuring second language (L2) proficiency and literacy development. Teaching content matter to immersion students in a language in which they have limited proficiency clearly requires teaching strategies unlike those used in mother tongue instruction. Concurrently addressing content, language and literacy development through their students' L2 requires significant teacher preparation and professional development (Lyster and Tedick 2014). It would appear therefore that immersion teachers require an essential knowledge-base, deep understandings and key competencies beyond those required in ordinary mainstream classrooms (Baker 2003; Cammarata and Tedick 2012; Lyster 2007; Ó Ceallaigh 2013; Ó Ceallaigh and Ní Shéaghdha 2017).

The supply of high quality teachers with the necessary language, cultural and pedagogical competencies is core to successful immersion programme implementation. Immersion teacher preparation, therefore, is essential for the continued success and growth in language immersion education across the globe. In most international contexts, a qualification in elementary education, which focuses mainly on teaching content, is deemed sufficient by state requirements to teach in an immersion setting (Tedick and Fortune 2013). The Republic of Ireland is no different. In Ireland, immersion teacher credentials are parallel to those of non-immersion teachers even though research constantly highlights how the specific needs of teachers in Irish-medium contexts are not being met by current provision in initial teacher education (ITE) (Mac Donnacha et al. 2005; Máirtín 2006; Ní Shéaghdha 2010; Ní Thuairisg 2014; Ó Ceallaigh 2013; í Duibhir 2009; Ó Grádaigh 2015; Uí Shúilleabháin 2015). This article reports on how a curriculum specialisation, focusing on the teaching of mathematics in the IMI elementary setting attempted to narrow the chasm that exists between ITE offerings and IMI practitioner realities.

### Knowledge demands for teaching mathematics

In order to teach mathematics, teachers need both *subject matter knowledge* (SMK) and *pedagogical content knowledge* (PCK) (Hill, Schilling, and Ball 2004; Steele 2013). Subject matter knowledge consists of *common content knowledge* (an ability to ‘do’ mathematics), *specialised content knowledge* (mathematics knowledge unique to teachers) and *horizon knowledge* which is an awareness of related concepts (connections). Pedagogical Content Knowledge (PCK) refers to content knowledge for teaching i.e. transformation of subject matter knowledge into a form which makes it accessible to learners. PCK consists of *knowledge of content and students* (knowledge of learners’ typical errors and misconceptions, for example), *knowledge of content and teaching* (knowledge of appropriate planning and sequencing of instruction) and *knowledge of content and curriculum* (understanding the characteristics of the mathematics curriculum). This knowledge collectively has been labelled ‘Mathematics knowledge for teaching’ (MKT) (see Figure 1) (Hill, Schilling, and Ball 2004).

### Additional knowledge demands in immersion settings

While all elementary teachers work to develop appropriate MKT, those working in immersion settings require additional knowledge to teach effectively. Scholars have argued that in addition to native or near-native proficiency in instructional language(s), immersion teaching requires a particular knowledge base and pedagogical skill set (Day and Shapson 1996; Fortune, Tedick, and Walker 2008; Freeman, Freeman, and Mercuri 2005; Lyster 2007; Snow 1990).

It is essential that the immersion teacher is a proficient user and model of the immersion language and displays a broad range of advanced linguistic skills and competencies consisting of the knowledge of specific lexicon, grammar, semantics, orthography, phonology, sociolinguistics as well as discipline-specific language i.e. SMK (Hult and King 2011; Wong-Fillmore and Snow 2002). In addition to this, immersion teachers also need to know how to transform this declarative knowledge of the immersion language into effective pedagogical tasks (PCK, see Figure 1). An understanding of the process by which immersion students acquire languages, a comprehension of how to implement instructional strategies that push language development forward and the capacity to create a meaningful and relevant context which promotes language learning and development are fuelled by a thorough knowledge of second language acquisition (Hamayan, Genesee, and Cloud 2013; Harley 1993; Howard and Sugarman 2007; Lightbown and Spada 2006; Lyster 2007).

Elementary immersion teachers face the challenge of balancing language and curriculum area content in instruction (e.g. mathematics). The complexity that integrating content and language presents for the immersion teacher has been well documented (Author 2001; Cammarata and Tedick 2012; Walker and Tedick 2000). Knowledge of the respective content area (in this case MKT) and

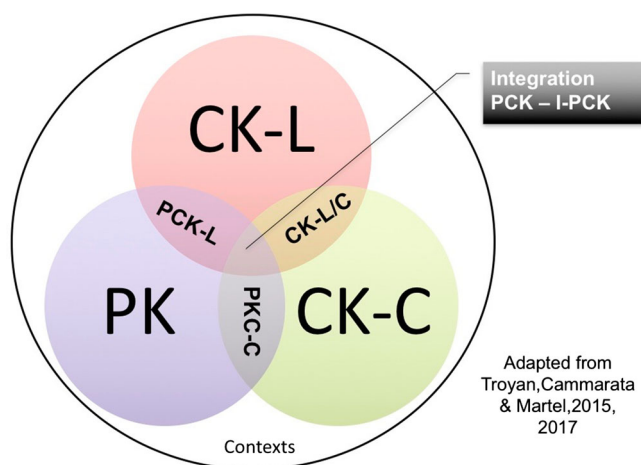
TEACHER KNOWLEDGE					
SUBJECT-MATTER KNOWLEDGE (SMK)			PEDAGOGICAL CONTENT KNOWLEDGE (PCK)		
Common Content Knowledge	Specialized Content Knowledge	Knowledge at the mathematical horizon	Knowledge of Content and Students	Knowledge of Content and Teaching	Knowledge of content and curriculum

Figure 1. Conceptualisation of mathematics knowledge for teaching (MKT).

language (in this case SMK and PCK of Irish) in isolation is not enough. However, the exact detail of what constitutes the type of knowledge particular to immersion pedagogy is yet to be fully understood. Developed from Shulman's work (1986, 1987), this unique body of knowledge may be defined in terms of the interaction of different knowledge domains (see Figure 2), namely, (a) content knowledge of language used as a medium of instruction (CK-L), (b) content knowledge of the curriculum area (CK-C), (c) pedagogical knowledge (PK)- knowledge about the teaching and learning processes, practices and strategies, (d) the interaction between CK-L and CK-C (CK-L/C) (e) language pedagogical content knowledge (PCK-L) – the interaction of PK and CK-L, (f) curriculum area pedagogical content knowledge (PCK-C) – the interaction of PK and CK-C. PCK for content and language integration (I-PCK) is an amalgam of all knowledge domains and may be defined as the situated synthesis of immersion teacher knowledge (Trojan, Cammarata, and Martel 2015). Table 1 presents examples of the various intersections within the I-PCK knowledge domains. Key elements of I-PCK include proactive planning, instructional counterbalance, integrated assessment and integrated mindset (Tedick 2015). This model, based on Shulman's (1987) pedagogical content knowledge (PCK) framework and Mishra and Koehler's (2006) TPACK adaption of that framework, is designed to map the different domains of expertise and knowledge an immersion teacher would need in order to plan and implement a well-integrated approach to content and language instruction.

Having identified the ever-evolving knowledge base required to be an immersion teacher, challenges for immersion teachers and indeed immersion teacher educators remain. Even though immersion students display fluency and confidence in their L2 use, the level of L2 accuracy and the range of L2 competencies achieved are less than native-like (Genesee and Lindholm-Leary 2013; Ó Duibhir 2009; Swain and Johnson 1997) and it has been suggested that the less than optimal levels of students' immersion language 'persist in part because immersion teachers lack systematic approaches for integrating language into their content instruction' (Tedick, Christian, and Fortune 2011, 7).

Many researchers claim that optimal language learning in immersion requires careful attention to form within a meaning-driven context of specific content instruction (e.g. Cammarata and Haley 2017; Cammarata and Tedick 2012; Gibbons 2002; Lyster 2007, 2011, 2016; Morton 2017; Ó Ceallaigh, Leavy, and Hourigan 2016; Swain 1998; Tedick 2006). Gibbons (2002, 132) for example, argues that 'there is a place for children to learn *about* language, as well as to learn it and to learn through it'. She proposes the idea of an hourglass image to illustrate how the focus of teaching and learning should change throughout instruction of a particular topic. Teaching and learning activities move at times from learning *through* language (meaning and knowledge construction), to learning



**Figure 2.** Pedagogical content knowledge for integration of content and language (I-PCK).

**Table 1.** Various intersections within the I- PCK knowledge domains.

Knowledge domain	Example from practice
CK-L [content knowledge of language used as a medium of instruction]	This comprises of declarative knowledge (i.e. a teacher's grasp of language systems and structures, as well as their knowledge of specific skills, lexicon, grammar, semantics, pragmatics, orthography, phonology, sociolinguistics, discourse analysis – knowledge about language (KAL)) and procedural knowledge (i.e. language processing, including online comprehension and production, for example, the teacher's own command/proficiency of the immersion language)
CK-C [content knowledge of the curriculum area]	This would include 'common' knowledge of mathematics (for example, distinguishing between a 2d and 3d shape), 'specialised' knowledge of mathematics (for example, the relationship between cylinders and prisms), and 'horizon' knowledge of mathematics (for example, the relationship between symmetry as a classification criteria for 2d shapes)
PK [pedagogical knowledge]	Broad principles and strategies of classroom management and organisation (for example, sequencing of instruction, grouping of learners, variety of teaching approaches and strategies)
CK-L/C [the interaction between CK-L and CK-C]	This encompasses knowledge about discipline-specific language and connotes the immersion teacher as a capable analyst and user of linguistic form and function related to the discipline (for example, lexicon, grammar, semantics associated with mathematics)
PCK-L [language pedagogical content knowledge – the interaction of PK and CK-L]	This domain highlights the ability of immersion teachers to make their language proficiency and KAL actionable in relation to immersion lesson design. It entails an understanding of the process by which immersion students acquire languages, a comprehension of how to design instructional strategies that push language development forward and a capacity to create a meaningful and relevant context which promotes language learning and development
PCK-C [the interaction of PK and CK-C]	This comprises of knowledge of content and students (KCS) and knowledge of content and teaching (KCT). These include knowledge of common student misconceptions, consideration of perceptions of mathematics as interesting or difficult, awareness of common approaches used by children when presented with specific tasks and attention to the sequencing of instruction to address misconceptions

Note: Adapted from Koehler and Mishra 2008; Troyan, Cammarata, and Martel 2015, 2017, PK, pedagogical knowledge; CK-L, language content knowledge; CK-C, curriculum area content knowledge; PCK-L, language pedagogical content knowledge; PCK-C, curriculum area pedagogical content knowledge; CK-L/C, Content knowledge required for integration of curriculum area and language; I-PCK, Integrated pedagogical content knowledge i.e. pedagogical content knowledge required for integration of curriculum area and language.

*about* language (looking at language as object) to once more learning *through* language. In this fashion, teaching progresses from meaning to form, from whole to part, and back again.

Despite our increased awareness of the importance of providing a balanced instructional focus on form and meaning across the immersion curriculum, immersion teachers' understandings of how to design and implement the most effective and efficient *blend* remains incomplete (Cammarata 2010; Cammarata and Tedick 2012; Fortune, Tedick, and Walker 2008; Harley 1984; Hoare and Kong 2008; Lyster and Mori 2008; Ó Ceallaigh, 2013; Salomone 1992; Södergård 2008). Thus, the challenges linked to language development and/or content mastery faced by students in immersion settings can be partly attributed to insufficient attention being paid to either the teaching of content, language or literacy skills as well as insufficient knowledge on how to effectively facilitate the interplay between these dimensions all at once at the curricular and instructional level. Despite the wide variety and dynamic nature of immersion programmes across the globe, the practical application of a logical pedagogy of integrated language and content instruction remains a conundrum.

While there is a significant dearth of research 'on a wide variety of topics relating to teacher development' in immersion internationally (Tedick and Wesely 2015), research focusing on pre-service immersion teachers is even more limited. Such research is critical in supporting pre-service teachers' pedagogical development so as to enable them to enact the complex, though essential, instructional practices such as those associated with the implementation of a well-integrated approach (Lyster 2016).

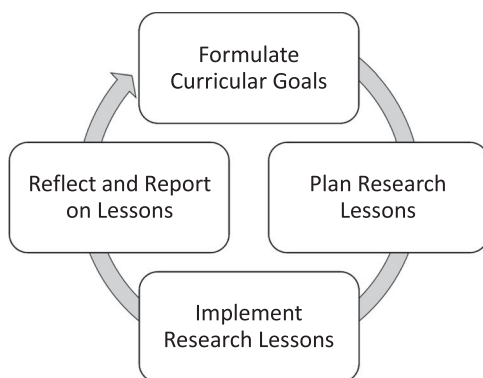
## Context of this study

After working as both a teacher and principal in an immersion setting; prior to becoming a second language educator in a College of Education (ITE provider); one of the authors was acutely aware of the complexities and challenges associated with teaching in a IMI elementary setting. While there were some efforts within the ITE programme in question to provide support to pre-service teachers who were completing school placement in IMI elementary settings, these were ad hoc and supplementary to the mainstream provision in the area. This led the author to approach his mathematics education colleagues (and co-authors) and jointly consider how to best examine the issue of preparing pre-service elementary teachers to teach in an immersion setting focusing in this instance on the subject matter content of mathematics.

Cammarata and Tedick (2012) reported on the ‘lived experience’ of qualified immersion teachers (in different school levels, immersion languages and subject matter content) over an extended period. This study is more focused. It examines the experience of a small group of pre-service elementary teachers when teaching mathematics in an Irish immersion setting. This provides unique and critical insights into the knowledge demands of mathematics teaching in Irish immersion settings for pre-service elementary teachers.

## Lesson study as a tool for revealing knowledge

It is through an emphasis on looking at practice as it occurs in the classroom that we hope to capture the complex and interconnected knowledge demands that arise in IMI elementary classrooms as pre-service teachers teach mathematics. We selected Japanese lesson study (LS) (Fernandez and Yoshida 2004) as our organising framework as it is a form of continuous professional development that focuses on instructional improvement through collaboration with teachers in planning research lessons and later examining the impact on learners (see Figure 3). The research lesson is the focus of effort in LS wherein teachers work together on the design of a research-informed lesson that allows a coordinated focus on lesson objectives, teacher actions, students’ responses and assessment (cf. Ertle, Chokshi, and Fernandez 2001). While LS has a long history of use by practicing teachers for improving classroom practice (Lewis and Tsuchida 1998; Stigler and Hiebert 1999) it is increasingly being used in initial teacher education (ITE) as a vehicle to promote a focus on teaching and learning (Cajkler et al. 2013; Chassels and Melville 2009; Sims and Walsh 2009). In Ireland, LS is becoming increasingly prevalent in ITE predominantly in efforts to support the development of mathematical and pedagogical understandings of pre-service teachers (Corcoran 2008; Hourigan and Leavy 2016; Leavy 2010, 2015; Leavy and Hourigan 2015a, 2015b; Leavy, McMahon, and Hourigan 2013).



**Figure 3.** The lesson study cycle.



## Methodology and methods

### Participants

Seven final year pre-service elementary teachers who were interested in teaching in an IMI context, two mathematics educators and one Irish language educator used LS to plan and implement a series of mathematics lessons in an IMI elementary setting. The study participants were undergraduate pre-service elementary teachers in their final year of a 3-year concurrent Initial Teacher Education programme. They had completed all mathematics and Irish language teaching pedagogy courses and school placement requirements (at junior, middle and senior grades). Participants had elected to enrol in the IMI elective. The sole focus of the 12-week elective was Lesson Study (see below for details).

### Research question

The research focused on the following research question:

- What were pre-service teachers' experiences of planning and teaching mathematics in an IMI setting?

### Procedure

The LS cycle (see [Figure 3](#)) was conducted over a 12-week semester which was divided into 3 stages. Participants met twice weekly for 4 h per week.

Stage 1: The first 5-weeks, the *research and preparation* stage, had three foci: Lesson Study (LS), immersion pedagogy and mathematics teaching. Firstly, participants were introduced to the practices of LS through engaging in relevant readings and reflections and watching videos of LS (c.f. Fernandez and Yoshida 2004; Lewis and Tsuchida 1998; Stigler and Hiebert 1999). The second emphasis was on exploring immersion pedagogy research and practices through readings, discussions and participating in video conferencing sessions with key scholars in immersion education (cf. Cammarata and Tedick 2012; Lyster 2007; Walker and Tedick 2000). Finally, geometry teaching was the mathematics focus. Participants were divided into two 'LS groups' consisting of 3–4 members. Each group carried out research around the content and pedagogical dimensions of teaching two geometrical concepts in elementary IMI classrooms. Hence, stage 1 culminated in the design of two lessons per group focusing on the development of understandings of polygons, symmetry and 3D shapes; which would be presented as a series of four geometry lessons. Participants were responsible for selecting geometrical activities and tasks, identifying the associated language dimensions and designing experiences to support children in developing and utilising *content-obligatory* and *content-compatible language* (Snow, Met, and Genesee 1989). *Content-obligatory language* is required for children to 'develop, master and communicate about a given content material', while *content-compatible language* is additional language that can be incorporated into the lesson to increase language acquisition but which is 'not required for successful content mastery' (Snow, Met, and Genesee 1989, 206).

Stage 2: The 4-week *implementation* stage involved firstly teaching the series of 4 geometry lessons to 5th class students (age 11) in a local IMI elementary school across four consecutive days. Each day, a pre-service teacher taught the designed lesson. During the teaching, the LS group and teacher educators observed and evaluated classroom activity, student learning and specific dimensions of interest in relation to content and language integration in immersion. Following each lesson, the LS group and teacher educators met and shared their observations focusing on both (Irish) language and (mathematical) content dimensions. Each lesson was then modified in line with observations and subsequently taught 7–10 days later with a second different, yet comparable,



class of immersion students. Participants then *reflected* upon their observations of this second lesson. This second implementation was video recorded.

Stage 3: The LS cycle concluded with a 3-week *reflection* stage where each LS group made presentations of the outcomes of their work to their peers and lecturers. Each group provided a summary and critique of their lessons with particular attention to the language and content dimensions. Video excerpts were used to illustrate and provide insights into classroom practices. Each participant also submitted a reflective assignment focusing on theories of immersion pedagogy and learning and reflections on what participants learned about the role of language in content and language integrated learning and about the teaching of geometry in IMI settings.

**Data collection**

The study was a collective case study (Stake 1995). Each LS lesson constituted a case; thus the analysis was structured around 4 cases. The principal data collection technique was participant observation; the three teacher educators were closely involved with each LS group and moved between roles of participant observer and mentor (knowledgeable other). Data collection was closely aligned with and ran concurrent to the LS cycle. Table 2 details the links between the LS cycle and the data collection process. Individuals and groups were observed, and data collected, as they moved through each of the LS stages. Data were collected relating to this process, in particular, all iterations of lesson plans were collected, notes were taken during meeting of groups, observations were made during teaching of lessons and records of children’s work were collected. These components provided insights into the knowledge demands of teaching mathematics in IMI settings.

**Data analysis**

All qualitative data were analysed using a grounded theory approach. That is, rather than starting with a theory to be confirmed or refuted; the data analysis process allowed the theory to emerge from the data gathered. A systematic process of data analysis was adopted by the authors. Initially the ‘raw’ data were organised into natural units of related data which seemed to fit together (Creswell 2009). These units were labelled under codes e.g. ‘Limited content knowledge prior’, ‘Language versus content’, ‘Benefits of collaboration’. Through successive examinations of the relationship between existing units, the authors found that some codes were subsets of others and therefore could be amalgamated (Cohen, Mannion, and Morrison 2000). This regrouping process highlighted the richness of the data, as substantial relationships existed between units. Progressive drafts resulted

**Table 2.** Data collection procedures aligned with the lesson study cycle.

Steps of the LS cycle	Data collection structure and method
Stage 1: Research and preparation stage	<ul style="list-style-type: none"><li>• Researcher field notes taken during lectures, work sessions and LS group discussions</li><li>• Record of resources used to research and design lessons</li><li>• Lesson plans</li></ul>
Stage 2: Implementation stage	<ul style="list-style-type: none"><li>• Observations of first lesson implementation</li><li>• Field notes from group discussions following first teaching</li><li>• Record of changes made to revised lesson and justification of those changes</li><li>• Observations of second lesson implementation</li><li>• Field notes from group discussions following second teaching</li><li>• Video records of second lesson</li></ul>
Stage 3: Reflection stage	<ul style="list-style-type: none"><li>• Videotaped group presentations</li><li>• Individual reflections</li></ul>

Note: LS, Lesson study.

in the ‘firming up’ of themes (Woods et al. 2000). At the end of the process, what started out as copious pages of information were inductively translated into a number of broad themes which represented a generalised model of the issues central to pre-service elementary teachers within this study. Subsequently, the qualitative data from participants’ individual reflections (see Table 2, Stage 3) were transformed into descriptive frequencies (Creswell 2009). The authors were particularly interested in points at which the data sets agreed, disagreed and differed.

## Discussion of findings

Participants’ experiences were categorised as falling into one of the following four themes: A ripening reconceptualisation, Becoming a language-attentive teacher, Development of I-PCK, and Provision of structures to support reflection. All quotations have been translated from Irish.

### *A ripening reconceptualisation*

Generic ITE programmes reinforce teachers’ view of themselves as content teachers (Cammarata and Tedick 2012; Tedick and Cammarata 2012). The majority of study participants ( $N=5$ ) believed that their generic ITE programme did not prepare them well for the unique context of IMI education. They reported that ITE experiences did not explore the principles of immersion pedagogy and the essential competencies and prerequisites needed to ‘become’ an IMI teacher.

At the beginning of this initiative, I did not have much understanding at all in relation to immersion. We didn’t have any lectures. Information was not made available to us in college about immersion. It is a challenge for us now to understand all that is immersion (Individual reflection: Bróna, Translation (Trans.))

Three pre-service teachers viewed the LS module as a necessity for immersion teachers to enable them to understand the connection between language and content in immersion and to embrace their role as both content and language teachers and in so doing, have an *integrated mindset* (Tedick 2015).

A course like this should be made available to teachers before they teach in gaeilscoileanna (Irish-medium immersion elementary schools) in order to support them in designing and teaching lessons with a focus on both language and content during lessons ... (Individual reflection: Máire, Trans.)

### *Becoming a language-attentive teacher*

Becoming a language-attentive teacher was demonstrated by an increased awareness of the role of language in content-based instruction coupled by a need to balance content and language in instruction.

### *The role of language in content-based instruction*

In immersion, successful content learning is particularly dependent on language. All pre-service teachers ( $N=7$ ) commented on their developing sense of awareness of the role of language in content-based instruction (CK-L, PCK-L and CK-L/C).

I now understand that every teacher in the world is a language teacher, during every content lesson, in every country, in every language (Individual reflection: Éabha, Trans.)

Some pre-service teachers ( $N=3$ ) had assumed that immersion students would learn language through exposure to language enriched learning environments. Prior to LS, they did not perceive the facilitation of the integrated learning of language and content as a pedagogical necessity in immersion.

Even when I was on placement in a Gaelscoil (Irish-medium school), I didn’t ever pay much attention to the language. As the children used the language each day, I just thought that it would be easy for them to pick

up new language without really teaching it. I now know that it is necessary to teach the language also. (Individual reflection: Máire, Trans.)

We thought that the children would have a lot of the language but we were wrong. We had to teach it. They didn't have the necessary language functions required to complete tasks. It was necessary to teach the vocabulary, the functions and the grammatical structures and to scaffold the language learning through the use of charts/posters etc. (Individual reflection: Cáit, Trans.)

Even when pre-service teachers ( $N=4$ ) described how they attended to language during content instruction in immersion prior to LS, the emphasis seemed to be on the teaching of content-specific vocabulary with priority given to meaning transfer and linguistic comprehension.

Before this, I taught in Irish-medium schools. When I was teaching there, I always began the classes with teaching the necessary vocabulary to the children. I did this to ensure that the children understood the content of the lesson rather than learning the language itself. Now I know that there should be an equal emphasis on language and on content (Individual reflection: Noirín, Trans.)

### *The need to balance content and language*

The data as a unit suggests that the LS process heightened or in some cases even awakened participants' 'awareness' of the importance of integrating and balancing language (Irish) and content (Mathematics) in their teaching. Their lack of experience of this practice was apparent in the early stages of planning (stage 1) and within the first lesson observation (stage 2).

On the first day of the polygon lesson, we didn't have much input or modeling of the necessary language functions. As a result, there was an imbalance between mathematics and Irish – something we did not want. Achievement in both was necessary! (Individual reflection: Éabha, Trans.)

In the lessons we taught, it was clear that there was more of an emphasis on content rather than language and it should not be like that (Individual reflection: Bróna, Trans.)

In group presentations also, participants acknowledged the need for balance between language and content as well as the fact that initial attempts to plan were imbalanced in the direction of the content (see [Figure 4](#) (Group presentation 3)).

## *Development of I-PCK in immersion settings*

### *Proactive planning*

Immersion planning aims to strike a balance between language and content learning. Initially content mastery took centre stage during the planning process (Stage 1). Reference to language objectives in mathematics lessons, if at all, was frequently reduced to the listing of content-specific vocabulary which promoted primarily lexically oriented learning as evidenced during observations. Semantic aspects of vocabulary were highlighted with little or no attention to other aspects of linguistic code (e.g. phonology, grammar, functions, discourse and sociolinguistics).

It is necessary to identify more than vocabulary – what about language functions, grammar, content-compatible language, language skills? (Feedback on lesson note of teach 1 from second language educator, Trans.)

This reflects the findings of Fortune, Tedick, and Walker (2008) which reported similar practices among Spanish immersion teachers.

In immersion, language and content objectives should have equal and complementary status (Lyster 2011). During Stage 2 of LS, revised lessons had clear objectives based on genuine and explicit challenges in relation to content and language and it was apparent that the integration of language and content was intentionally and systematically planned for. In addition, content-compatible language objectives which were overlooked in Stage 1 of the LS planning process were also identified in the second teach of the lessons:

Content-compatible language associated with groupwork as well as content-obligatory language so as to enable children to communicate with others in the class with reference to mathematic related tasks, e.g. it is my turn, I don't understand, how many ... (Lesson note: Teach 2, Trans.)

Pre-service teachers' own knowledge of terminology and linguistic competence were also factors shaping their instructional planning as the following excerpt from Deirdre illustrates:

It is necessary to be accurate to ensure that you are modeling accurate Irish for the children. I have to admit that my Irish was not accurate in planning nor did I have all the vocabulary ... (Individual reflection: Deirdre, Trans.)

Others ( $N = 4$ ) also highlighted specific language deficits and insecurities in relation to their own competence in the Irish language (CK-L).

Overall, the LS experience cultivated better habits of immersion planning for all participants. This was evident from revised lesson notes, observations and individual and group reflections. The experience positively impacted on pre-service teachers' level of awareness, knowledge and skills in relation to immersion planning. Almost all ( $N = 6$ ) commented on their new learning which demonstrated an increased awareness and professional growth of CK-L/C in their instructional practices.

After engaging with this experience, I see that there are many implications for me as an immersion teacher. For example in terms of planning language objectives – ensure to identify functions and grammatical structures beforehand; plan for content-obligatory and content-compatible language ... On top of that you can never assume that children will have the necessary vocabulary ... (Individual reflection: Éabha, Trans.)

An important element of any teacher's practice is to reflect critically upon their planning and instruction. Cáit explained how purposeful planning in immersion is not a once off event but rather a continuous process which occurs before, during and after any learning situation.

... I now see that there is a lot more involved in immersion planning. You need to be continually planning. (Individual reflection: Cáit, Trans.)

### Counterbalanced instruction

It seems that one of the complex challenges the pre-service teachers faced was finding the balance between exploiting authentic content matter (mathematics) in communicatively rich environments while simultaneously paying systematic attention to language development during instruction.

No language input directed at content-obligatory language, not to mention content-compatible language. Additional attention to input is required in implementation

It was evident however, that pre-service teachers reviewed and analysed their practices from teach 1 and demonstrated an evolving understanding of the role of PCK-L in planning and instruction (see Figure 5, group 2 presentation).

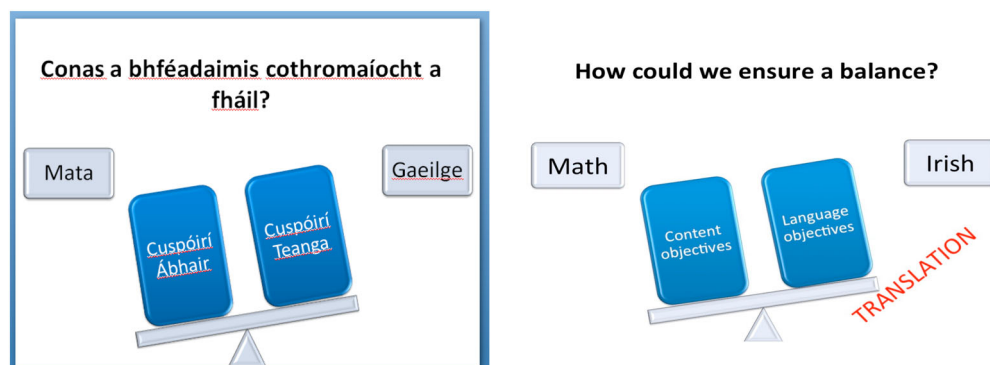


Figure 4. Group presentation slide addressing the imbalance between language and content.

Through reflection and analysis, participants acquired a developing understanding of how to raise students' awareness of learning mathematics and Irish in an integrated fashion in Teach 2.

Strong emphasis on content-compatible language this time. Teacher engaged in focused modeling ... (Fieldnotes based on observation of teach 2 from second language educator, Trans.)

Language instruction was integrated with meaningful academic instruction to provide students with real reasons for learning language and language acquisition was embedded in authentic communicative contexts. Pre-service teachers utilised strategies including carefully constructed demonstrations and modelling, think-alouds, print rich visuals, graphic organisers and games not only to make lessons comprehensible but also to draw students' attention to language (i.e.PCK-L). The following excerpt demonstrates how a think-aloud was used to achieve the latter:

Teacher: Listen to everything Sadhbh says and tell me then some things she said. (Video recording of polygon lesson, teach 2, Trans.)

Instructional techniques that ensure the comprehension of subject matter taught through the immersion language are at the core of immersion pedagogy and are a requisite for students' academic achievement. Cáit described how a game was introduced to develop language, content and cognitive skills.

It was very important for the teachers to model this task firstly (and all the tasks) so that children would know (a) how to do the task (b) what language was needed to do the task (Group presentation: Cáit, Trans.)

As well as their verbal input, teachers also used body language, including gestures and facial expressions and a wide range of paralinguistic<sup>1</sup> elements. Language learning experiences were scaffolded throughout lessons by drawing students' attention to contextual supports (PCK-L).

We will draw their attention to the posters when we are hanging them and also during the lesson to provide a scaffold for them in terms of vocabulary.

Alongside providing comprehensible input to students, pre-service teachers were also aware of enabling the students to practice and use the language:

You need to practice and recycle the language also and we did this by utilising individual, group and whole class questioning (Individual reflection: Bróna, Trans.)

They also became aware that instruction also needed to focus on form. Éabha offered the following insight from an individual reflection:

The most important thing is to place an emphasis on language use and not just comprehension. You can do this by placing an emphasis on form and on structure of the language ... (Individual reflection: Éabha, Trans.)

### **Na Fadhbanna a bhain leis an gcéad cheacht**

#### **Ó thaobh na Gaeilge de**

1. Ní raibh dóthan ionchur teanga
2. Ní raibh dóthan múnlu – eiseamláirí.
3. Míchothromaíocht idir Mhata agus Gaeilge

### **The difficulties associated with the first lesson**

#### **In relation to Irish:**

1. There wasn't enough language input
2. Not enough modeling – functions.
3. Imbalance between mathematics and Irish

**TRANSLATION**

**Figure 5.** Group presentation slide identifying issues in Teach 1.

On occasion, reflection on and viewing of teach 1, prompted a renewed emphasis on linguistic form.

We saw at the end of the second lesson that the children did not have the language functions to describe the nets of a cube ... We should provide the children with the language functions and then ensure to scaffold the learning in the classroom ... (Individual reflection: Noirín, Trans.)

However, when teachers employed complementary instructional strategies which were designed to make content-based input more comprehensible while simultaneously making target features more salient, students were enabled to build on each other's talk, extend their range of vocabulary and sentence structures and negotiate meaning and form simultaneously. All pre-service teachers demonstrated a developing sense of understanding of content-based and form-focused instruction:

I knew that it was about integrating language and content but I did not know how to integrate them effectively – especially grammar. I can say now that I am going in this direction ... (Individual reflection: Bróna, Trans.)

... I learned that I can design a task to teach language and content in an integrated manner. (Group presentation: Noirín, Trans.)

These findings support the importance of teachers understanding and addressing the complex issues relating to teaching content in an L2 (i.e. I-PCK) setting. Findings presented in this section highlight the impact pre-service teachers' personal and professional experiences had on what they thought and did in terms of planning and instruction in immersion and as such illuminate the multiple ways the exclusive and complex process has been for them in becoming an *immersion* teacher. Clearly much more research is needed in the Irish context to determine what ITE experiences enable teachers to demonstrate a deep understanding of I-PCK.

### ***The importance of providing structures that support reflection on the important components of I-PCK***

Considering that students had completed 4 school placements and a minimum of 10 weeks teaching in a school (each of which focuses on the teacher as a reflective practitioner), it was astonishing to find students acknowledging that genuine reflection was a new consideration:

I had never given much thought as to some of the things I would change if I were to teach one of the lessons I had taught on teaching practice for a second time (Individual reflection: Máire, Trans.)

Almost all of the students ( $N = 6$ ) referred to the focus on reflection within LS. Some felt that it sent them a message which they previously had not received:

It made me realise that not every lesson is going to be perfect and that it is ok as long as you realise what went wrong and you address the issue the next day or the next time you are teaching the lesson (Individual reflection: Brid, Trans.)

Others reported that the process had made them aware of the importance of reflection in parallel to practice:

LS has taught me the importance and the necessity for self-evaluation and assessment after every lesson so that it can be improved for the next time it is being taught ... we were able to reflect ourselves and also use feedback from colleagues to make changes so that when teaching the same lesson again, many of the obstacles we faced could be avoided the second time around (Individual reflection: Sadhbh, Trans.)

Over the process of the LS cycle (see [Table 2](#)), the student teachers demonstrated increasing abilities to engage in genuine reflection. This is reflected in the record of the post-teach 1 meetings:

While some of the issues are extremely basic e.g. organization, poor explanation, in light of the time and support given in their preparation (PCK), it is somewhat consoling that the students did not require any prompting in the areas which need to be addressed prior to teach 2. On most occasions, they were very conscious of the weaknesses and open to considering how they can best be addressed (Field notes of group discussion, mathematics educator 2)

Students themselves reported of the reflection skills they acquired through participation in the project:

... I gained skills of critical evaluation and reflection (Individual reflection: Máire, Trans.)

I now have the strategies to reflect on my lessons in a structured way and also in a way that will enhance the children's learning (Group presentation 3: Bróna, Trans.)

## Conclusions

Opportunities to research the knowledge demands of content teaching in immersion settings are limited; however, the experiences provided by such opportunities afford invaluable insights into the complexities of immersion teaching and support the development of an integrated mindset (Tedick 2015). The structures of LS supported participants in unravelling the complex pedagogical practices and skill set required to teach in immersion settings. The level of detail required in planning (Ertle, Chokshi, and Fernandez 2001), combined with the participation of mathematics and language experts, helped parse the complex interrelationships that often remain hidden in immersion teaching. Moreover, the conversations during planning and the reflections on practice helped to make explicit, for participants, the decision making and reasoning that informed content and language pedagogical decisions. Cajkler et al. (2013) refer to the complex situation of classroom teaching as a 'pedagogic black-box, which can remain either partially or wholly shut up in individually-oriented teacher placements' (550). We agree, and furthermore we contend that focusing on knowledge in practice as it was rendered within the LS environment was in stark contrast to the individual-orientation of traditional teacher placements experienced previously by participants. Another unique and critical aspect of this study design was how it enabled the researchers to engage pre-service teachers in aspects of teacher noticing critical to immersion teaching. The study provided opportunities for participants to identify what is important or noteworthy about a classroom situation (van Es and Sherin 2002) and make informed teaching decisions based on the analysis of these observations.

Immersion teacher knowledge is multifaceted and understanding any element of it is a complex task. The 'lived' experiences of the immersion pre-service teachers in this study highlighted specific immersion language deficits (C-KL, PCK-L and CK-L/C). These linguistic deficiencies also constrained their capacity to implement a well-integrated approach. The I-PCK analytical tool (Trojan, Cammarata, and Martel 2015, 2017) as utilised in this study, not only enables us to probe and then map different domains of immersion teacher knowledge; it also enables us to identify deficiencies in particular domains to be consequently addressed through bespoke targeted professional development initiatives. The use of such an analytical tool in immersion ITE is promising and has the potential to narrow the chasm that exists between ITE offerings and IMI practitioner realities.

Evidence from this study suggests that LS support based on the I-PCK framework extends and transforms immersion teacher knowledge which in turn enables them to advance I-PCK implementation in immersion. More research is needed to establish what type of support is most effective and whether and how the I-PCK framework could serve as a basis to derive guidelines for immersion teacher education and professional development. We hope that the present study utilising LS and I-PCK will pave the way for many more explorations of this type.

Opportunities for immersion teachers to engage in on-going, in-depth, systematic, and reflective examinations of their teaching practices are critical. In the Republic of Ireland, opportunities for pre-service teachers to engage with immersion oriented pedagogies and research are rare. A school placement experience which includes opportunities for systematic observation, collaborative work with school staff and structured participation in school life in an IMI context is also atypical. Despite widespread agreement that the supply of teachers with the necessary language and pedagogical competence is a key driver of effective delivery of Irish-medium education, currently no Irish College of Education in the Republic of Ireland provides an ITE programme directly focused on the knowledge base and pedagogical skill set needed to *become* an effective IMI teacher. Such programmes are



clearly called for to enable teachers to shape and nurture an *integrated mindset* (Tedick 2015), to understand the critical connection between language and content, and to develop the mandatory linguistic competencies and associated pedagogical practices of IMI teachers (I-PCK). This in turn would enable the creation of educationally sound, contextually appropriate and socially equitable learning opportunities for all stakeholders.

## Note

1. Nonlexical elements of communication by speech e.g. a characteristic style or manner of oral expression.

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