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Mathematics as (Multi)cultural Practice: Irish Lessons From the Polish Weekend School

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In this article, the authors challenge the erroneous assumption that mathematics is universal, and thus culturally neutral, by critically investigating diverse cultural meanings and "ways of knowing" that influence individual/social (affective) forms of identity. The authors begin by briefly detailing the structural features of a Polish weekend school and providing an overview profile of the Polish community living in Ireland. The rationale for the "weekend" school is then discussed from both Polish and Irish perspectives. Empirical data suggest a greater need for "parallel integration," whereby two divergent education systems attempt to culturally coalesce at some level of school policy and/or mathematics classroom practice.

Keywords: Irish cultural lessons, multicultural mathematics, parallel integration, Polish weekend school

Polish Education in Ireland

Background

The Polish "weekend" school in Cork (Szkolny Punkt Konsultacyjny w Cork) was first established in 2007, an organisation that shares the same physical site as its "host" Irish primary school and is so-named because it operates on Saturdays and Sundays. Students are taught three curricular subjects: Polish history, literature, and mathematics. Each subject is assessed yearly and student records are kept in accordance with Polish school standards. It is possible for Polish children living in Ireland to participate in the Irish state examination system and, as such, undertake a subject test in the Polish language. It is also possible for Polish children living in Ireland to participate in the Polish state examination system, though doing so requires travel to Warsaw. In effect, Polish children are preparing for the possibility of both options by virtue of their dual membership of host and weekend schools.

In the Irish school, they meet Irish students and Irish teachers, engage an Irish curriculum and Irish textbooks, and speak English in class (some study Irish as well). In the Polish weekend school, students and teachers are exclusively Polish; all work with Polish textbooks and a Polish curriculum, and speak Polish in and out of class. Students in the school range in years: Pre-primary (Przedszkole, 3–6

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years), Primary (Szkola Podstawowa, 6–13 years), and Lower Secondary General (Gimnazjum, 13–16 years). The ten teachers in the school are all Polish qualified (to master's degree level) and are called by their first name. The school day itself reflects Polish operational norms (e.g., parents may visit classrooms without prior appointments, there are five to ten minute breaks after each lesson, and a school council operates in accordance with Polish legislation). The weekend school, in effect, is a Polish enclave—an ambassadorial centre for the 40 million Poles still living in Poland, a social place where new Polish friends can be made, a home away from home, a place where the Polish school system can continue its work.

The students, teachers, and parents of this weekend school constitute a small share of the Polish population living in Ireland, estimated to be between 140,000–160,000 persons. The last population census published in 2006 reveals that there were more Polish persons (1.5% of the population) than there were Black (of African or Irish identity) persons (1%), Asian or Asian Irish (1.3%), and Irish Travellers (0.5%). Polish persons then accounted for 26% of all immigrants to Ireland. The Polish language unofficially became the second language of the Republic of Ireland given that "more people spoke it on a daily basis than spoke Irish" (Hegarty, 2009, p. 199). At the time of the 2006 census, the vast majority (over 90%) were catholic; 20% of the Polish working community were in construction (29% of all Polish males were in this category); 20% were in the manufacturing industry; 15% worked in the wholesale and retail trade; and 15% were employed in hotels and restaurants (28% of all Polish females were represented here). A mere 117 Polish teachers were in "official" teaching posts, only 2 persons were members of the Gardaí (Police force) and 4 were in the Irish army. In 2006, 38.3% of non-Irish nationals leaving full-time education had a Third Level (i.e., university) qualification, compared with 28.2% of Irish nationals. In relation to the Polish community: 55% were educated up to upper secondary level; 3% at non-degree Third Level (i.e., diploma or an equivalent university qualification); and 23% at degree or higher level (there were almost twice as many Polish women as men educated at this latter level). In terms of the overall non-Irish national population, 6% declared that they had some form of disability (with almost equal division between males and females). Just 2% of the Polish community made such a declaration, which included 191 persons who claimed to have "difficulty in learning, remembering or concentrating," 120 declaring a "learning or intellectual disability," and 183 persons having a "psychological or emotional condition." No details were given regarding the measure of language difficulties and/or a broader appraisal of "cultural adaptation."[1]

[1] At the time of writing, analysis of the latest 2011 census was being officially conducted (the full report is due to be released late 2012). For the first time, questions relating to individuals' native language (other than English or Irish) were asked, including their levels of proficiency in English. Beyond some basic linguistic measure, however, a more thorough enquiry into levels of cultural adaptation was still lacking.

Rationale for the Weekend School

The vast majority of the Polish population in Ireland has extensive experience of the Polish education system—these are mostly adults. By contrast, many children have had to adjust to student life in the Irish national system. Indeed, some of the youngest children cite the Irish system as their sole educational experience. The weekend school serves to connect a migrant community with the Polish education system, drawing on individuals' past experiences and offering opportunities for first-hand or repeat experience. Cultural identification is strengthened by a common educational purpose, marked in particular by the study of Polish literature and history. Further, the study of Polish mathematics "officially" connects with a strong sense of national economic purpose. The weekend school, then, presents as a key means through which Polish immigrants can (re)connect with their cultural identity. Consequently, it remains in high demand from parents of diverse social strata. Enrolment has increased from an initial figure of 250 pupils in 2007 to just over 600 in the 2010–2011 school year.

This increase in participation represents no mean feat, particularly in the context of a deep economic recession. Net emigration figures in Ireland now outstrip those of net immigration. In recessionary times, immigrant communities are oft hard-pressed, even to the point of being forced to re-emigrate.[2] Yet, the weekend school continues to benefit from financial (albeit reduced) support from the Polish government. Looking back at an interview on 7 December 2007 with a senior Polish embassy official in Dublin, we were reminded of the reasons for such sponsorship. The weekend schools (across 5 locations in Ireland) were presented as: proffering real cultural connections between the Polish Diaspora and the "mother nation," enabling young Polish nationals to "keep alive" their language and sense of history, and preparing Polish families for possible re-entry into Polish society and its employment market. The senior embassy official believed that, for Polish parents living in Ireland, their "rational" motivation for school participation was grounded in "not wishing to complicate their children's life" under returned migration circumstances. Of course, Polish children's lives can also be complicated under migration circumstances. There was some concern expressed on the part of the Polish official about how Polish children (and their parents)

[2] To illustrate, Hegarty (2009) notes that as the recession took hold in 2008 the numbers of non-Irish nationals seeking unemployment assistance rose a full 100% in just one week—from 16,000 to 32,000 persons. Recent cutbacks to unemployment assistance, educational supports (e.g., English Second Language teachers [E2L] and Special Needs Assistants [SNAs]), and premium wage rate entitlements are likely to create more conditions of adversity for the non-Irish national population. Evidence suggests that both Irish and non-Irish nationals are exiting in significant numbers—figures for the 12 months to April 2010 show about 65,300 people leaving Ireland, with both groups being almost equally represented (Hennessy, 2010). The emigration total in 2011 is estimated to have increased to 100,000 persons.

"become integrated" into the Irish school system and Irish society. However, this concern lay outside the immediate realm of weekend schools given that "they are not dedicated to integration…a connection that is missing." Thus, as we have highlighted elsewhere (see Long & O'Brien, in press), a situation of "parallel accommodation" appears to exist, where two education systems (weekend and host schools) operate alongside one another without official mutual judgement or comparison.

From an Irish perspective, the principal of the host primary school spoke to us in April 2008 about the establishment of the weekend school. He had learned of the unique plan from his Polish Special Needs Assistant (SNA) who was undertaking valuable work helping non-Irish national children integrate into the Irish system. The plans for the weekend school received full backing from the host school principal and it was arranged, for a nominal rental fee, that the host school's physical site be utilised. Interestingly, much of the SNA's official work in the host school focused on English language instruction. This focus may have influenced initial Irish reactions to the Polish school's existence, with teachers in the host school questioning whether Polish students would be exposed to English language lessons on the weekends. Such a cultural deficit assumption—namely, a principal concern for perceived linguistic shortfall (despite the fact that many Polish children speak a number of languages)—soon yielded to another culturally accepted/acceptable attitude. This assumption was centred on the analysis that the Polish weekend school would serve to "re-assimilate" children upon their return to the Polish education system. In the words of the host school principal:

> The Polish government obviously needs to keep in contact with their own people—they need to do something to attract them back to their country and they also need to do something so that when they do come back, they can assimilate easily back into the system.

Both weekend and host schools' support for re-assimilation appears perfectly rational. However, such support is likely to reinforce, what MacEinri (2010) calls, "culturally defined and racially bounded notions of ethno-nationalism." Thus, the Poles are viewed as having their own people, their own country, and their own education system, and the Irish as having theirs. This reinforcement serves to further legitimate a parallel accommodation of separate education systems. Of course, there are some benefits to the establishment of parallel institutions, not least the preservation and maintenance of so-called native and migrant cultures (e.g., Gibson, 1984). Respected on both sides is the intractable purpose of both education systems to further the socialisation of children and the replication of a society's values (Long & O'Brien, in press). However, such separation can be stark. Parallel institutions cannot presuppose inclusionary practices, particularly

of a multicultural quality. Furthermore, separation often fails to purposely speak to the lived reality of migrant pupils who regularly inhabit diverse cultural worlds.

Aims of the Study

The weekend school is thus accommodated—literally by the host school and methodologically by both Irish and Polish systems. Its spatial temporality mirrors a transitory identification with which Polish (economic) migrants and their children are perceived by both native and migrant cultures.[3] Yet, we found some evidence of "temporary accommodation" being disturbed, or at least questioned. This temporary accommodation appeared in an interview conversation with the principal of the weekend school following her return from a professional development conference in Warsaw. The conference in question was organised by officials from the *Ministry of National Education* and the *Ministry of Science and Higher Education* for the Diaspora of Polish teachers living and working in Europe. As well as providing information about recent changes to the Polish education system, the conference stressed the importance of maintaining and improving educational outcomes.

This emphasis in itself is not surprising, especially in the context of Europe's preoccupation with standardised forms of educational commodification (see, e.g., O'Brien & Brancaleone, 2011). However, the conference's interest in educational outcomes took a specific shape, centring on a perceived dissonance between Polish children's school achievements in Poland and Polish children's school achievements abroad. Here, the weekend school principal impressed upon us the widespread view that returning migrant children "were experiencing big problems coming back to Poland." Questions were being asked about how weekend schools were preserving standards so cherished by the Polish education system. How, the principal was frequently asked, could weekend schools (in accordance with their official function) further help Polish children upon their return? What were weekend schools doing about returning children's "language and maths problems"? While some questions were also asked about "what Polish children are doing in Irish schools," this particular interest in Irish school practices lacked rigour—due in no small part to a seemingly powerless position to influence "a different system, an Irish one." Thus, from a Polish perspective, the primary emphases on return and "ease of transition" rested with the weekend school.

[3] Contrary to transitory images, many Polish migrants stay longer in host countries. A survey of Polish migrants in the United Kingdom (Centre for Research on Nationalismm, Ethnicity and Multiculturalism, 2004), for example, revealed that approximately 30% of the population adopted a "wait and see" approach to the duration of their stay, 15% indicated that they wanted to stay in the United Kingdom permanently, and 30% intended to bring their families and children over or that their families were already in residence.

In reality, ease of transition is of analogous importance for the Irish schooling system. For teachers and pupils of Irish and non-Irish backgrounds, many challenges persist in pursuit of more integrated classroom practices. Research seminar discussions and interviews with Irish student teachers clearly reveal these challenges.[4] In particular, student teachers made known to us how emotionally invested they had become in their attempts to more fully integrate non-Irish national children in their classrooms. Strong feelings of empathy, support, and personal/professional responsibility appeared alongside those of frustration, powerlessness, and unfamiliarity. Many described integration as personally and professionally demanding. To illustrate, one respondent spoke of Irish pupils' "poor attitudes" towards non-Irish national groups and his personal/professional reaction:

> Some of my students said, "Sir, I don't like Poles." "What do you mean"? I replied. They said, "Sir they're taking all the jobs"…and I finally brought all the kids around and said: "If *you* go to university or become a plumber or a carpenter, you have a right to go abroad and work in the EU." And part of me felt, as middle class, we are not competing for jobs with Polish people whereas children from this socio-economic background, their dads and mums might be.[5]

The above quote forefronts the weight of teachers' own multicultural beliefs and predicaments. It also highlights the potential impact of *hidden curriculum* messages on individual/social forms of identity. Further, it demonstrates genuine opportunity, arising from real-life learning moments, for multicultural commitment in the classroom. In subsequent seminar discussions, student teachers also indicated a number of demanding *formal curriculum* challenges. In particular, they noted the predominance of Irish forms of cultural knowledge: "they [non-Irish national pupils] study Irish mountains most of the time, Irish historical figures, Irish literature." With reference to mathematics instruction, one respondent noted:

> I teach maths. We have lots of examples like "Sean went to the shop," "Mary bought an ice cream." What's the most popular name in Poland, Lithuania or Algeria? If

[4] Between us, we have some 31 years of experience working with student teachers and we both teach on the *Inclusive Multicultural Education* module on the Professional Diploma in Education (DE) programme in University College Cork. The series of research seminars we refer to were conducted in the academic year 2008–2009 as part of the Ubuntu research project (sponsored by Irish Aid). There were 3 seminars in total with an average of 10 student teachers in attendance on each occasion.

[5] Significantly, there was no non-Irish national pupil present in the class—had there been, the student teacher admitted that his own actions "may have been different." This suggests a sense of reluctance and uncertainty on the part of student teachers to engage controversial (seen as possibly divisive) class discussions, particularly in relation to matters of ethnicity and race. More critically, such a position may be viewed as an avoidance of multicultural commitment in the classroom.

> everyone around you is Irish and you're not, they [Irish pupils] think you're different.

While this perspective presents as some challenge to monocultural approaches to mathematics teaching and learning, it appears fragile in effecting substantial methodological change. Deeper cognitive and affective forms of learner engagement were manifest in one student teacher's English lessons. Specifically, this student teacher utilised portfolio work to elicit pupils' (cognitive) understanding of a lesson on biography, thus engaging the theme multiculturally. Moreover, much (affective) importance was placed on personal experiences and feelings, in the interest of advancing pupils' knowledge of self. Thus, one such portfolio entry began:

> My name is Agnieska. I am 13 years old. I was born on the 8th February 1994. I am from Poland but three months ago I moved to Ireland. I am going to Irish school and am living here with my family. My father is economist, but for one year he works as carpenter. My mother is teacher but she does not work now. I am a happy cheerful teenager. I am often smiling. Sometimes I feel very badly, but very fast I forget about the sadness.

From such insights, we became curious as to why some subjects (mostly associated with the humanities) appeared more culturally relevant than others (Ladson-Billings, 1995c). Specifically, we questioned why mathematics might be commonly viewed as more culturally "neutral." We set out, therefore, to explore if *Polish mathematics*—measured against the weekend school's teaching and learning arrangements—disclosed a particular cultural character. We wished to particularly explore some key cognitive and affective learning effects to establish any such cultural significance. Thus, we were interested in the cultural dynamics of "coming to know" mathematics and sought to examine how diverse cultural meanings and "ways of knowing" might influence individual/social (affective) forms of identity. Furthermore, we were interested in the potential impact of our study's findings. If Polish mathematics did exhibit a discrete cultural way of knowing and being, what lessons could be learned by Irish teachers and Irish schools? Moreover, we asked: Can two divergent education systems culturally coalesce at some level of school policy and/or classroom practice? These key questions inform the research direction of this article.

Mathematics as (Multi)cultural Practice

Culturally relevant pedagogy (e.g., Gay, 1995, 2000; Grant, 1978; Ladson-Billings, 1995a, 1995c) is a well-established discipline in educational literature. Emerging from a diverse interest and scholarly base (from anthropology and cul-

tural studies to critical race theory and inclusive multicultural education approaches), culturally relevant pedagogy signifies a collective worldview that affirms difference amongst students, teachers, and their school communities. Discrete cultural knowledge (or ways of knowing) is recognized, alongside important influences on affective forms of identity. Schools are a key (though not exclusive) means wherein certain teaching and learning practices are culturally formed and beliefs about one's culture and others are developed. Traditional practices and beliefs are recognized as being in a state of constant flux, even if this may not be immediately obvious. Advocates of culturally relevant pedagogy seek to challenge school traditionalism through critical reform of such areas as: home-school partnerships, use of pupils' prior experiences, inclusive methodologies, formal and hidden curriculum messages, assessment policy and practice, and teachers' personal/professional development. There is paramount concern in this empowering educational approach for positive cognitive and affective outcomes. In the case of the former, culturally relevant pedagogy is epistemologically concerned with "how to become a better learner" (e.g., using cultural referents to encourage meaningful problem solving and support academic success). In the case of the latter, culturally relevant pedagogy is ontologically concerned with "how to relate to oneself and others" (e.g., using cultural referents to explore one's emotional attitudes to cultural identity and participate in an inclusively diverse collective). In both cases, cognitive and affective outcomes rely heavily on the relative strength of culturally relevant teaching and learning practices in a school. These practices are aimed at all students, not just those who are culturally diverse. Mathematics education is not exempt and, necessarily, engages the multicultural dimensions of "content integration, knowledge construction, prejudice reduction, equity pedagogy and an empowering school structure and social structure" (Ladson-Billings, 1995b, p. 144).

This position belies the common image of mathematics as a universal, culture-free discipline. From its history, mathematics remains the product of many cultures and is, in essence, "pan-cultural" (Greer, Mukhopadhyay, Powell, & Nelson-Barger, 2009, p. 2). In addition, Swetz (2009) notes that mathematics both reflects the culture it serves and is, in turn, shaped by that culture. Thus,

> even as a pure intellectual activity abstractly manipulated, mathematics must adhere to formal systems of analysis and expression established by the mathematics *community* (p. 12, emphasis added).

Discrete cultural groups (e.g., a Polish school community) thus make sense of mathematical experiences together and classify, codify, and communicate these experiences symbolically. This intimate relationship between mathematics and culture generates critical cognitive and affective consequences.

Cognitive Outcomes

Cultural references abound in mathematics textbooks. Many textbook examples speak to deeply shared cultural values, such as attitudes towards family, kinship, occupational roles, the nature of lifestyles or friendship, preferences for competition or cooperation, and so on. These values run deeper than surface cultural references to food, religious festivals, celebrations, and the arts. In effect, they often speak to unconscious norms and to profound levels of emotion attaching to cultural membership.[6] Such cultural content influences the choice of mathematics materials and instructional methods used in classrooms. Thus, ways of knowing mathematics are culturally imbued, supported mostly by learning activity that remains strongly rooted in local community practices. The community in which the student is "situated in" and learns his or her mathematics, then, significantly affects his or her understanding and application (Boaler, 2000). This situated perspective restructures mathematics from an image of smart people and individualistic endeavour to one of smart contexts and co-constructive activity (Barab & Plucker, 2002).[7] In concert with culturally relevant approaches, teachers utilise meaningful cultural referents to support their students' deeper understanding of mathematics. Teachers also strengthen their students' academic success in reasoning, analysing, justifying, inferring, and deducing. This strengthening is authenticated by the exchange and co-construction of community beliefs, social practices, codes, classifications, and symbols. While ensuing cognitive outcomes may be more difficult to quantify than test scores, they can, nonetheless, be most affirmative. It is claimed that culturally relevant approaches frequently produce higher levels of student engagement and attendance, parental involvement, and general learning fulfilment (Ladson-Billings, 1994; Mukhopadhyay, Powell, & Frankenstein, 2009).

If ways of knowing and learning mathematics are culturally situated (Lave & Wenger, 1991), then teachers will need to have a deeper understanding of their students' cultural worlds. In the case of non-Irish national students, Irish teachers will need to appreciate and value their cultural practices, especially those relating

[6] We are grateful to our colleague Karl Kitching for his conversational insights into these deeper forms of cultural membership.

[7] Contemporary political/ideological moves towards individual testing and content or product-driven approaches to numeracy (e.g., Department of Education and Skills, 2010) strongly endorse an image of individualistic endeavour and "smart people." This approach has the effect of disconnecting individuals from their collective cultural identity and disembodying their relative position within formative power social structures. Culturally relevant pedagogues challenge this apolitical image of mathematics and argue that the underscoring of cultural connectivity and relational embodiment is ultimately aimed at advancing more equality in schools and society (e.g., Nieto, 1992; Ladson Billings, 1995a).

to communication, peer/adult interaction, and knowledge construction (Moschkovich & Nelson-Barber, 2009). Beyond typifying cognitive behaviour,[8] teachers will need to understand how individuals culturally filter their learning to include "preferences for thinking, observing and (inter)acting…, as well as how they approach schooling" (p. 117). Such understanding allows for flexible learner management, including a respect for students' opportunity to "code switch" in mathematics education. Code switching here refers to students' concurrent use of two or more language and/or symbolic forms. In acknowledging code switching, teachers can affirm the variety of students' linguistic/symbolic, cognitive and cultural forms of communication. This affirmation is especially important for bilingual students who read, listen, write, speak, and think in two or more languages for different purposes, in different contexts, with different people (Moschkovich & Nelson-Barber). Code switching between languages does not appear to affect the quality of conceptual thinking (A. Cumming, as referenced in Moschkovich & Nelson-Barber). It may be beneficial, allowing students to problem pose and solve in different ways and in different contexts (a type of additive bilingualism?). Or code switching may be a hindrance, such as when a student does not fully understand a mathematics word problem (a type of restrictive bilingualism?). Simple conclusions, then, cannot be drawn about a student's mathematical proficiency on the basis of his or her code switching (Moschkovich & Nelson-Barber). Nevertheless, for studies such as ours on bilingual learners in bicultural school settings, code switching presents as an absorbing area of cognitive concern.

Of course students also communicate mathematically and this shapes, and is mirrored by, culture. Beyond technical language, discourse practices include modes of argument, ways of abstracting and generalising, as well as mathematical claims, representations, and imagining (Moschkovich & Nelson-Barber, 2009). Everyday, as well as academic, mathematical discourse is communicated (Moschkovich & Nelson-Barber). For the bilingual learner, this presents both linguistic and conceptual challenges in understanding: everyday words (in both Polish and English), formal mathematical words and symbols (in Polish and Irish settings), as well as diverse mathematical problems and their inherent logic.[9] Teachers of multicultural student groups need to be particularly mindful of how mathematics

[8] Gutiérrez and Rogoff (2003) caution against viewing variations in cultural practices, including cognitive behaviour, in terms of traits of individuals or collections of individuals. Rather, beyond essentialist assumptions, variations exist as "proclivities of people with certain histories of engagement with specific cultural activities" (p. 19). The focus of explanation, therefore, ought to be on individuals' and groups' experience in activities, not their traits.

[9] We draw heavily here on Miller-Jones and Greer's (2009) discussions on students' (whose birth language was Spanish) understanding of English written mathematics tests. Vygotsky's relationship between language and concept formation likewise informs the challenges outlined here for bilingual learners (e.g., Vygotsky, 1978).

is communicated via assessment procedures. An assessment for learning approach (National Council of Curriculum and Assessment, 2010) challenges traditional modes (e.g., standardised testing) and emphasises the need for a greater qualitative understanding of students' experiences, interests, and abilities over time. This approach engages students in their own learning development and facilitates a sharing of learning focus, tasks, and assessment criteria. While there can be no built-in relationship between learning style and minority group membership, culturally responsive teachers understand and value the "proclivity" of students to cognitively act in certain ways (Gutiérrez & Rogoff, 2003). They employ assessment processes that are more flexible, on-going, personalised, and development-led. In this way, they come to learn more about their students ("get inside their cultural heads") and themselves (e.g., their own cultural norms and practices). This cultural interaction (of self and other) displaces the so-called objective image of mathematics (i.e., facts speak for themselves) with a more humanised representation (Gay, 2009). In turn, mathematics reveals the sharing of cultural knowledge as essential to human development (Gardner, 2004).

From a cognitive perspective, Polish students' experiences of the weekend school's cultural activities are worthy of investigation. If certain cultural ways of knowing are made more visible, then Irish teachers can learn more about their students and themselves. Specifically, a culturally responsive approach to mathematics proffers teachers the opportunity to, inter alia: affirm their students' cultural identity and knowledge; challenge the expert metaphor of mathematics as a top-down activity; and provide greater access to different ways of seeing, understanding, and doing mathematics.

Affective Outcomes

The Polish weekend school embodies a specific cultural membership, with its own use of language, codes, social relations, customs, and ways of communicating and reasoning. For its members, the migrant experience endures as a strongly shared attachment. While migrant children are affected by the same issues as all children, they are especially required to develop complex strategies for coping with migration (Ni Laoire, Bushin, Carpena-Mendez, & White, 2009). These strategies are profoundly influenced by peer culture and parents' experiences and material circumstances. Such strategies are similarly shaped by the efficacy, or otherwise, of host migration policies and practices, including educational arrangements (Ni Laoire et al.). Thus, community, parental and institutional milieus strongly sculpt migrant children's emotional responses and strategies to schooling.

Multicultural education aims to support children in their understanding of home culture, while simultaneously freeing them from cultural boundaries (Banks, 1992). At its heart lies an "ethics of diversity" informing "respect, soli-

darity and cooperation with difference" (D'Ambrosio, 2009, p viii). Mathematics and mathematics education that "have everything to do with this ethical necessity" (D'Ambrosio, 2009, p viii) seek a transformed image of mathematics and its representation in people's lives. Thus, the familiar image of mathematics as universal, and its narrow association with nationalistic and competitive interests, is challenged by a human relations vision of mathematics, with its stress on individual differences and collective affinity (Gutstein, 2009). This transformation enables us to acknowledge that, in different cultural contexts, children and adults may participate differently in conversation, discussion, debate, and explanation. Thus, diverse mathematical discourses are shown to co-exist due to the high dependence of mathematical practices "on natural language as well as other semiotic systems" (Moschkovich & Nelson-Barber, 2009, p. 112). Bilingual students in bicultural/multicultural classrooms, in particular, use different languages and symbolic forms to express mathematics differently (Moschkovich & Nelson-Barber). Moreover, teacher-student expectations may differ across diverse cultural contexts and these are likely to impact on students' knowledge of subject material, as well as their motivations to learn. This possible situation highlights the importance of emotional interactions between teachers and students (Hargreaves, 2000). In particular, teachers' knowledge of the everyday experiences of their students is essential in informing inclusive classroom methodologies (Gay, 2009). These inclusionary methodologies reveal an enduring relation between the cognitive and affective dimensions of learning.

Diverse cultural meanings and ways of knowing mathematics, then, directly relate to individual/social forms of identity. These affective outcomes are observable in students' feelings about mathematics, including the value they place on the discipline. In bicultural settings (e.g., Polish and Irish schools), differences and affinities naturally co-exist. In negotiating these, Polish children code switch their feelings about mathematics, alongside modes of thinking and practice. Concomitantly, questions of self-identity and group membership emerge, such as: How do I feel about the weekend school? How do I feel about the Irish school? What is my relationship to language—Polish, English, and Irish? How do I view, and adjust to, both the Polish and Irish communities? Do I internalise any sense of difference or similarity in relation to educational provision and/or social mobility opportunities? Some questions are more explicit than others. All are not exclusively cross-cultural, because diversity exists *within*, as well as between, cultures. Also, identities are never static, as multiple affiliations become realigned over time in different contexts (Gardner, 2004, p. 38). Such insights highlight the developing role of education in nurturing key affective competences. Of these, "multicultural capital" has a critical and contemporary value:

> A person who has "multicultural capital" is someone who is able to decode and understand the diverse signs of their social and cultural world, someone who is com-

> fortable residing in such a world and who is able to relate to that world with confidence. Such a person would neither feel that their own identity is threatened by difference, nor would they feel superior to those who appear different. (Gardner, 2004, p. 29)

In this article, we argue for the educational development of this affective competence, via the promotion of mathematics as (multi)cultural practice.

Methods

Collectively, we have some 31 years of experience working with student teachers and we both teach on the *Inclusive, Multicultural Education* module on the Professional Diploma in Education (PDE) programme. We approach this research project as "interested scholars," a phrase that denotes how we come to this research project by now engaged with various multicultural theories, concepts, and/or ideas. Thus, we are interested by virtue of our extant research interests, regular presentations and scholarly writings in the field. From a contemporary perspective, we are interested in Ireland's newfound multicultural context and by emergent challenges to cultural integration. This article's particular interest rests with a concern for inclusive classroom practices in mathematics. Why mathematics? Mathematics is frequently associated with a universal knowledge base and is associatively presented as culturally neutral. Here, we are interested in the cultural dynamics of coming to know mathematics and are seeking to examine how diverse cultural meanings and ways of knowing might impact on individual/social (affective) forms of identity.

Secondly, we approach this study as investigative researchers. This description reflects the fact that, hitherto, not much was known about so-called Polish weekend schools. Thus, by utilising a broad-based qualitative approach to research, we set out to critically investigate school and classroom practices, with a view to investigating what meaningful cultural lessons, if any, could be gleaned for Irish education. It was envisaged that our, as yet, informed position could have important parallel integration opportunities, whereby two divergent education systems attempt to culturally coalesce at some level of school policy and/or mathematics classroom practice.

We chose a broad-based qualitative research approach for this investigation. The previous literature review makes the case for mathematics as (multi)cultural practice, providing important thematic focus to both its cognitive and affective outcomes. We were mindful of these conceptual insights in seeking further explanation from empirical findings and elaborating upon their understanding. The empirical work sought to critically describe, organise, and analyse lived accounts of our numerous visits to the school. A collection of qualitative research methods engaging key actors were utilised for this purpose, including: semi-structured in-

terviews with the principal and head maths teacher of the weekend school, observations of a sixth class primary mathematics class (12 year olds), and individual conversations and focus group interviews with pupils of this class. In addition, analyses of Polish and Irish mathematics textbooks were undertaken.

Since 2007, we have visited the Polish weekend school on numerous occasions. The following empirical insights emerge from our latest lived accounts of these visits (four visits in 2010–2011). Specifically, classroom observations, semi-structured interviews, and textbook analysis combine in an attempt to unearth participants' real cultural engagement with mathematics. Particular research focus is on sixth class primary mathematics (12 year olds) and the ways in which students think about, and identify with, Polish mathematics.

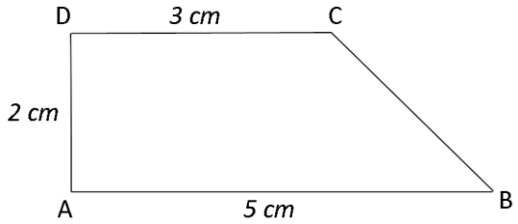
Insights into the Polish Weekend School

Cultural Ways of Thinking in Mathematics

From early on, many students told us that Polish mathematics was "harder" than its Irish counterpart. It was difficult to argue with this assertion. In classes that we observed, some challenging mathematics problems habitually emerged. Thus, on the topic of fractions, students in sixth class primary (12 year olds) were asked to solve: 4 1/3 – 7/9. The majority of students successfully attempted this problem and the teacher quickly reviewed the solution on the board. Interestingly, analysis centred on the advanced use of equivalent and improper fractions—not the LCM (Lowest Common Multiple), as we (from an Irish perspective) might have expected.[10] Thus, the solution read:

4 1/3 – 7/9 = 4 3/9 – 7/9 = 3 12/9 – 7/9 = 3 5/9

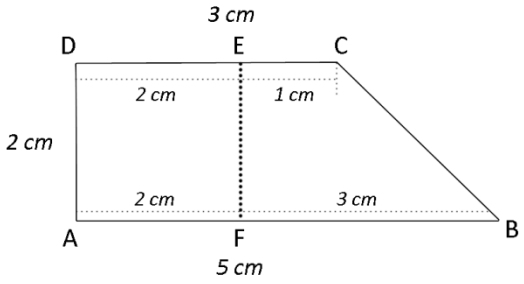
Another challenging problem presented itself in a geometry lesson:



Here, students were asked to find the area of the trapezium ABCD, but with a difference. Moving beyond relatively undemanding solutions (e.g., composite shape

[10] One might have also expected (from an Irish perspective) to read the solution in a scrolled (i.e., vertical step-by-step) format, as opposed to its linear (i.e., horizontal step) appearance.

or formula approaches), students were tasked with dividing the shape into two equal areas in order to prove that the areas of these two shapes equalled the entire area of the trapezium ABCD. Thus, the solution read:



The area of the left hand side shape (square ADEF) = length x width = 2 x 2 = 4 cms^2

The area of the right hand side shape (small trapezium BCEF) = [(top + bottom) x height] ÷ 2 i.e. [(1 + 3) x 2] ÷ 2 = 4 cm^2

The area of the big trapezium ABCD = [(3 + 5) x 2] ÷ 2 = 8 cms^2 which is equal to the two smaller areas added together.

The above examples demonstrate variances in levels of conceptual difficulty experienced by students in Polish and Irish schools. The weekend school appeared to demand greater investigative problem solving. Students were encouraged to use critical thinking and were not easily coached or supported in finding "easy" routes to the solution. Polish mathematics, it appeared, did not stress rule-based or formula approaches as much as (our knowledge of) Irish classroom practice. For example, the Polish mathematics teacher noted the reliance of students on the BIMDAS rule (*Brackets before Indices, Multiplication, Division, Addition and Subtraction*) learned in Irish school as limiting a more "natural" approach to solving problems. Moreover, students appeared over-eager to apply formulae to speed, distance, and time problems, instead of "working out the meaning behind them." Alongside more abstract expectations, Polish students were required to manually "work out" arithmetic problems, as calculators were disallowed for both school and homework use. Additionally, the full range of Real numbers was normalised, as (what might be commonly termed as) irregular solutions frequently appeared, for example 7/125 or 1.33, and so on. Similarly, it was not unusual for Polish students to regularly negotiate square roots and powers and engage with substantially small and big numbers. To illustrate, even as early as fourth class primary (10 year olds), students were tasked with notating large numbers, moving beyond Thousands, Hundreds, Tens and Units (as required in Irish school). Thus, one ex-

ample read: Convert 25150040500 into Polish.[11] Answer (translated from the Polish language): twenty five billion, one hundred and fifty million, forty thousand and five hundred.

This last example illustrates not just variances in conceptual difficulty but also in language proficiency demands. As highlighted earlier, socio-cultural learning theory forges a direct connection between language and conceptual development (e.g., Vygotsky, 1978). It is contended that meaningful access to words, terms, and/or symbols has the power to liberate more developed forms of thinking. Conversely, developed thinking is restricted by a limited access to discursive meaning. In our classroom observations, we had become aware that some Polish children had become so "used to using English," as one student put it, that Polish terms (including those mathematical) posed "a real problem."[12] Polish textbooks, like Irish ones, appeared very "wordy" and students had to constantly decode print, as well as mathematical literacy structures. Some were more successful than others in this regard. Thus, students' ability to negotiate within and across discourses was key to their effective communication with mathematics. Of course, this communication also involves code switching between different symbolic systems. To illustrate the necessity for such translation: the decimal point in Polish mathematics denotes multiplication, commas represent decimal points not thousands (or three-place positioning), and the division sign in Polish equates to the ratio sign in Irish mathematics (see Table 1).

Table 1
Different Symbolic Notation

Polish Symbolic System	Irish Symbolic System
68·3	68 x 3
79,3	79·3
42 : 15	42 ÷ 15

Moreover, the ways of "working out" problems differed. Thus, one can appreciate the challenge for bilingual/bicultural students when faced with this division problem: find 30,24 : 1,5 (i.e., find 30·24 ÷ 1·5) (see Figure 1). In attempting this question in the Polish maths class, we recall our own difficulties in symbolic

[11] Polish mathematics does not use commas to denote thousands (or three-place positioning); indeed, as we illustrate later, commas are only used to denote decimal points.

[12] This demonstrates that the Polish school is just as concerned with promoting its own language in a multicultural/multilingual social context. Irish schools' concern for language integration (including Gaeilge) is equally valid, though it frequently receives higher attention. Indeed, it may be argued that both perspectives ought to be critically engaged, especially in light of globalising influences on language and culture (see, e.g., Long & O'Brien, in press).

code switching, including working from right to left. A number of students told us that "this was so confusing" and that most were "not allowed to do it the other division way." Hence, both Polish and Irish schools frequently endorsed, as one student put it, their "own way of doing things."

Polish Division		Irish Division
20,16		20·16
302,4 : 15	15	302·40
- 30		- 30
02		024
- 0		-15
24		90
- 15		- 90
90		0
- 90		

Figure 1

Polish vs. Irish division.

That said, the two mathematical systems did exhibit similarities. These appeared most evident in a general emphasis on more traditional forms of teaching (e.g., demonstration approaches) and an associated reliance on textbook work:

> The teacher everyday corrects the homework and talks to us about new things and she gets us doing lots of work in the textbook. We do this in Irish school and at the weekend school. (student 1)
>
> My teachers show us lots of examples on the board, we listen to them and then we do out some in the textbook. (student 2)
>
> Both places are sort of like each other because we have to do writing out of examples and we get homework and we correct it right or wrong and we take notes in our copies. (student 3)

Textbook problems in both systems were positioned in terms of the perceived difficulty that they posed. In the Irish texts, part *c* of a problem indicated greater challenge than parts *a* and *b*, whilst Polish texts displayed a cactus symbol to ex-

emplify a higher degree of complexity. Polish students indicated to us that Irish text problems were "much easier" and that they regularly received top marks in exams. Their confidence in Irish mathematics was generally high and they associated this with their exam success, less arduous homework and, as one student put it, the fact that "you don't have to think in Irish maths." Polish textbooks went to some lengths in explaining solutions, offering sequential steps to logically work out problems. There were plenty of investigations presented that sought to "tease out" an appropriate investigatory stance from the reader. This appoarch encouraged a particular (cultural) way of working, invoking skills of reasoning, analysing, justifying, inferring, and deducing. In addition, texts were very colourful and were replete with cultural references specific to Polish topography, nature, economy (e.g., agricultural practices), food, currency, and measurements (e.g., the use of decagrams). Much of the homework was based on such textbook problems. Students indicated to us that homework demands were more challenging in Polish school, as it took longer to do and demanded a greater degree of "working out."[13]

Because of the perceived gap in conceptual difficulty and workload demands, Polish parents indicated to us that it was "tricky," as one put it, "to keep the kids interested in Irish school." Beyond such difference, however, many parents believed that "maths is the same." Furthermore, as the principal of the Polish school indicated, "our cultures are not that different." While this may, to some degree, ring true, discussions here and in previous sections indicate that mathematical practices do exhibit discrete cultural ways of thinking and doing. Perhaps Polish parents and teachers are not fully cognisant of this difference. One might assume that they are not alone—that Irish parents and teachers have a similar (mis)understanding. Certainly, it appears that the children are more fully aware of the cultural similarities and differences that co-exist in mathematics learning. While they may not always be attentive to such cultural distinction, and/or capable of its elucidation, it is they, first and foremost, who are faced with the (necessary) task of cultural negotiation.

Cultural Identification with Mathematics

Throughout our visits to the Polish school we were always struck by the presence of a real sense of community. After dropping off their children, parents would gather outside the school, exchange pleasantries, share experiences and sometimes, as the principal noted, form "support networks." The school operates a news bulletin on the Polish community in Ireland, hosts holiday festival events, and makes available Polish newspapers for purchase in the staffroom. A number

[13] This "higher" demand on time and critical reflection needs to be considered in the context of intense periods of Polish instruction and the heavy requirement to "cover" the Polish syllabus at weekends.

of parents work on a voluntary basis, supervising corridors, ringing the school bell, helping with lunches, and assisting with the school's attendance register. Students refer to all teachers by their first name and the staff attempts to create a "more relaxed" environment, very conscious of the fact that children are attending weekend school. The principal was keen to inform us that, given that more and more families "had joined their fathers" in migrating to Ireland, the Polish community had become more "solid." The school both mirrors and shapes this newfound identity. In many ways, it has helped to create a unique identity, serving parents and children that, as the principal put it, "are different from those in Poland" and "are different within the [Polish-Irish] community."

The majority of students, we spoke to, had an attractive blend of Cork and Polish accents. They told us the names of their Irish schools, some of which in Gaeilge (the Irish language), they pronounce expertly. We meet Mateusz who refers to himself as Matthew, for our (and one suspects) his Irish peers' benefit. This "name switching" is not unusual as children engage dual community membership that reveals interesting facets of their multicultural identity. To further illustrate, we asked sixth class students if they considered themselves to be Polish or Irish. At the outset, a slight majority of the 16 class members said they were Polish, the rest claimed they were Irish. The latter felt that it was "cool" that their Irish friends thought of them as Irish. Interestingly, one boy in a half joking response to this "Irish group" exclaimed "traitors" (in Polish), followed by "shame on you" (in English). When asked specifically if class members might consider themselves to be both (Polish and Irish), an overwhelming majority concurred. Notably, the dissenting boy did not. One girl in the class, sporting a scouts scarf inscribed "Cork Polish scouts," was very positive about her dual identity. Another boy proudly declared his knowledge of the Polish and Irish languages and stated that he now wanted to learn French. Many appeared to welcome dual community membership, telling their Irish friends about the Polish school and teaching them some Polish phrases. Others appeared guarded, fearing it would look "uncool" (as one put it) to declare school attendance at the weekends. All were in agreement that it was, as one put it, "hard to go to school all week." Many of the students were divided about their favoured way of "working out" mathematical problems—more tending to opt for "Irish ways" of doing maths over "Polish ways." The Polish mathematics teacher informed us that a greater exposure to Irish schooling meant that "this is always the way it goes." Interestingly, the vast majority of students counted in Polish in their heads, only some did so in English.

These insights indicate to us that students' shared migrant experience forms a core element of their identity formation. Individually, students are likely to negotiate their identity over time and in concert with personal contexts and experiences. Their feelings towards Polish and Irish schools were important in this regard. Many commented on the "friendliness" of Irish teachers, their "close" Irish

friends and their "belonging" to the Irish school and local area. Many felt that these feelings applied to the Polish school also. Accordingly, students viewed having two groups of friends and communities as being advantageous. At the same time, students appreciated that both sets of friends and communities were distinct. This appreciation might appear more obvious with respect to: the life experiences of Polish students and parents vis-à-vis those of their Irish peers; differences in food, cultural festivals, and patterns of family relations; the separate establishment of Polish and Irish schools; differences in conceptual difficulty between Irish and Polish mathematics; and the pressures to perform well in either or both, depending on future familial expectations, and so on. Undoubtedly, these apparent features of division affectively shape Polish children's self-identity. It was difficult for us to access students' appreciation of more covert differences affecting self-identity. An indication of more in-depth (and covert) feelings around difference emerged in a number of students' conversations on mathematical practice. Some had noted their feelings of frustration in Polish school at, as one student put it, "having to think and explain my answers." For these students, feelings of frustration were conflated with having to adopt an investi-gatory learner stance. Comparisons with Irish school were constantly made by all students with some feeling more comfortable with Irish ways of doing maths. This comfort level may be linked to their relative success in the Irish system and an associated confidence in the subject. Certainly, many students appeared to accept difference between Polish and Irish mathematics. Interestingly, this accept-ance was guided by the formal and hidden curriculum messages they received in the mathematics classroom. To illustrate, a number of students told us that they were not allowed to "use Polish maths in Irish school." When asked why, one girl replied: "They [Irish teachers] don't understand it."

It is interesting to note that it is Polish children, first and foremost, who are charged with affectively negotiating the acceptance of difference. This acceptance is not really considered by teachers and/or parents in both school contexts, particularly in relation to mathematical practice. Despite this, teachers and parents do influence Polish students' attitudes to diverse mathematical practices. Thus, parents who wish to return to Poland, the principal told us, tend to place more emphasis on the weekend school; those intent on staying in Ireland "focus more on Irish school." Many parents value both sites of education and children are no doubt influenced by this assessment. Students indicated that they received cultural support at home, particularly with symbolic translation, Polish expressions and mathematical techniques. Indeed, many students culturally supported their parents in decoding Irish schooling demands and clarifying letters of communication. Some, noted the principal, help their parents in real-life mathematics by frequently "communicating with banks and post offices." Teachers in both settings tended to value their own work with the children, charged as they were with covering

separate curricula. This, as highlighted above, was explicitly and implicitly communicated to the students who internalised this separation.

Perhaps the greatest source of cultural support emerged through peer networks. In our observations of mathematics classes, we witnessed students helping one another translate from Irish ways of doing maths to Polish ways, using both Polish and English instruction. Through this decoding, students scaf-folded their understanding and developed their confidence in mathematics. As noted previously, some were able to use their knowledge of both systems to advance their mathematical competence (a type of additive bilingualism /biculturalism). Others were more comfortable within one system. We spoke to one boy who had little trouble with Polish mathematics but, due to his limited access to English (including academic English), sought to "have help with Irish maths" (a type of restrictive bilingualism/biculturalism). These insights indicated to us the following: firstly, students' perseverance and ability to access and utilise cultural supports in mathematics was key to both their academic success and positive self-identity; and secondly, their capacity to draw on multicultural capital (Gardner, 2004) and relationally "fit in" was central to their fluid cultural identifi-cation with mathematics.

Parallel Integration: Irish Lessons From the Polish School

Here, we have demonstrated that it is Polish students who are, first and foremost, faced with the (necessary) task of cultural negotiation. This negotiation shapes new learner identities and engages significant cognitive and affective adjustments. Polish children therefore exemplify cultural literacy (i.e., act as "cultural readers") in response to malleable social and schooling experiences. Given that neither parents nor embassy officials nor teachers meaningfully attempt this mediation, the child is left to make his or her own way. Specifically, the teacher is inevitably absent from this area of cultural exchange in the classroom and from many minor actions that matter most to the child. The Polish teachers we met had never taught in an Irish school, nor did they know much about the Irish curriculum and schooling experience; similarly, from our knowledge of working with Irish teachers, they know little or nothing of the Polish curriculum and schooling experience. The teachers, parents, community workers, embassy officials we spoke to were all in the dark about the "other" system. In sum, the integration of two cultures occurs principally in the cultural identity of the child.

The case for the existence of parallel institutions that preserve and maintain discrete cultural values may be compelling in any multicultural society. Mutually incompatible values may never be reducible to a common agenda, even if this is worthy of pursuit. Whilst it is important to acknowledge and affirm such difference, a multicultural society that is interested in greater social cohesion will

seek to systematise "unity of diversity" conditions. At the heart of such efforts lies critique of the (oft implicit) acceptance of dominant cultural norms. It is likely that host teachers may be ill-prepared—apart from obvious language issues—to deal with different cultural constructions of knowledge and wide-ranging identities. Weaker multicultural policies and practices in schools—for example, a predominant focus on English language lessons for migrant children and the provision of exceptional curriculum pockets and learning supports—frequently distract from the lived experiences of the migrant child. These policies and practices are habitually informed by a need for "multicultural management" and the systemic priority of assuaging "challenges." Deeper multicultural policies and practices reject problem-focused interventions, seeking instead to affirm and respond to new social and schooling realities. These realities are not easily captured however, as they take time and effort to understand and require continual and personalised levels of response. School structures and supports remain commonly centred on mainstream provision and teachers are frequently engaged in normalising individuals' efforts and exercising standardised forms of curriculum and assessment. Accordingly, the qualitative substance of children's lives, including their learning development, is too often sidelined. This sideling is particularly relevant to migrant children.

The chairperson of the Polish school's parent association, seemed to understand this point well; it was he who prompted the view that the Polish school appears "at times [as] something separate." Moreover, he suggested to us the idea of a state-sponsored "multicultural centre," one that provides for all children—"Polish, Irish and others." For us, this indicates the need for an educational partnership that addresses the lived multicultural experiences of all children. Further, it recognises that identities are circumscribed by material and structural opportunities; that they are never "fixed" or "simply there" but, instead, emerge as a social process, made and re-made in context and in relation to others (Reay, 2010). In Irish schools, Irish and non-Irish national children share the same physical space. Any expected benefits of multicultural exchange will depend on how seriously (and deeply) the respective school engages with lived cultural experiences. This level of engagement will require moving beyond the foci on official school policy and the establishment of set curriculum programmes. Whilst welcome, their efficacy rests on dynamism, particularly practice-based engage-ment and the enactment of culturally relevant teaching. This is as relevant to mathematics teaching and learning as any other knowledge area. As we have demonstrated, there are many cultural lessons to be learned from the Polish school. Fundamentally, these lessons will emerge via the re-imagination of mathematics and its enactment as a living multicultural discipline.

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