Thinking Language Awareness at a Science Centre: 
Ipads, Science, and Early Literacy Development with Multilingual Kindergarten Children in Canada

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ABSTRACT
Situated in the highly multilingual context of Vancouver, this article discusses aspects of a collaborative research project, intertwining the development of language awareness and scientific, technological, and multilingual literacies in a science centre environment. Participants were multilingual, kindergarten-aged children who attended an interactive, activity-based science educational program in a local science centre and participated in writing activities in a nearby community centre. The article will discuss the science centre as a transformative learning environment to harness cultural and linguistic diversity, a vital resource to simultaneously develop language awareness, and science knowledge. Multimodal data sources include visual documentation of the linguistic landscape at the science centre, as well as photographs, video recordings and field notes of children working individually or in small groups, and a selection of the products children created.

KEYWORDS
Language Awareness, Multilingual Literacies, Pluricultural Repertoires, Plurilingual Approaches, Plurilingual Repertoires

INTRODUCTION
While Language and Content Integrated Learning (CLIL) covers a wide range of educational practice in which content knowledge is fully or partially taught through a second language in a variety of education environments (Mehisto, Frigols, & Marsh, 2008), most research in this area focuses on the classroom, and seldom explores CLIL intersections with science education and language awareness, multimodality and print literacy development (Langer & Neumann, 2012; Kress, Jewitt, Ogborn, & Tsatsarelis, 2001; Kress, Ogborn, & Martins, 1998). Specifically, little is understood about CLIL with young learners in other sites of learning such as science centres. The aim of this research is to address this issue by exploring how young plurilingual children use digital tools such as iPads to engage with science in a science centre. In this paper, the authors define plurilingual children as children who have knowledge and experience of, and engage in, several languages in their environment and their daily interactions, notwithstanding their level of competence (Coste, Moore, & Zarate, 1997, 2009). The term multilingualism is reserved to describe language contacts in the society and the environment.

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A plurilingual approach to language competence and learning insists on a holistic understanding of proficiency, and on the cross-fertilisation of languages for learning.

Our study presents an on-going collaborative research project, that articulates the development of scientific, technological, and multilingual literacies in a science centre environment. Children attended a series of workshops, the Budding Scientists, intended to provide learners with authentic learning settings, hands-on experiences and triadic forms of communication to scaffold language awareness and learning in English (L2), and to collaboratively develop science literacy, critical skills and to facilitate a joy of learning and wonder about the world in which we live.

The exploration involves a single case study with multiple, embedded units of analysis (Yin, 2009) that was conducted at a science centre, situated in the highly multilingual context of Vancouver, Canada. Three embedded units of analysis that defined the study were: 1) educational practices of all children in a dedicated instructional space, where a science centre staff member facilitated children’s engagement in science and multilingual literacy practices designed by the team; 2) the process of construction of an eBook as 4-5 children interacted with a volunteer research assistant; and 3) the individual case, where single children were observed exploring and deliberating, and where they were interviewed to further capture the complexity of their engagement with science and multilingual literacy practices in the galleries and with the volunteer research assistant and with other children.

The science centre where this research was conducted is situated on the border of the Downtown Eastside (DTES), a neighbourhood in the heart of Vancouver that is remarkable for its extreme poverty and linguistic diversity. One aim of the science centre is to reach out and engage local communities in better awareness and learning of science through a wide scope of interactive exhibits and educational programs. Several programs specifically address early learners (e.g., “Wee Explorers” for children aged 3-5 years; “Big Science for Little Hands” for children attending kindergarten). These educational initiatives all involve children’s active engagement in interactive exhibits, and are designed to connect current issues in science and environmental awareness with essential biology, chemistry, earth science, and physics concepts (Fenichel & Schweingruber, 2010), through the use of dynamic digital learning features like interactive touch-screens, experiments and games. Further, due to the multilingual and multicultural ecology of the greater Vancouver environment, the science centre has responded by drawing attention to and accommodating this diversity. Multilingual signage is common throughout the science centre, and serves as an incitement to encourage children to interact with exhibits. Research on knowledge translation in science centres suggests that interactive exhibits promote engagement, understanding and recall of exhibits and their science content (Schneider & Cheslock, 2003). McLean (1993) defines interactive exhibits as “those in which visitors can conduct activities, gather evidence, select options, form conclusions, test skills, provide input, and actually alter a situation based on input” (p. 93).

Within this highly dynamic and linguistically diverse, interactive environment, the authors discuss here the use of iPads as multimodal learning tools for raising language awareness (Blyth & Dalola, 2016; James & Garrett, 2014), developing multiliteracies (Nteloglou, Fannin, Montarena, & Cummins, 2014), and teaching science concepts through English in early childhood (Beschorner & Hutchison, 2013). A touchable interface insures that iPads are simple to use, even for very young children (Couse & Chen, 2010). Further, the iPad visual display provokes scientific literacy and language awareness, as plurilingual children interact with multimodality, practice sketching, writing, or lettering in different writing systems. As such, from a learning perspective, iPad applications (apps) are multimodal texts, which function not only as interactive tools to provide children with access to culturally-constructed meanings associated with science concepts, but also to invite them to act and creatively produce meaning themselves (Sandvik, Smørdal, & Østerud, 2009).

Children in the study were recruited to participate in a large-scale longitudinal research project to explore the development of executive functions and languages in plurilingual children, from the age of 5 to 8 years (Kindergarten to Grade 2). As an incentive to retain families’ participation in the research over the course of 3 years, and a means to increase science literacy, the authors created the Budding
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