

Innovation in the Face of the Fourth Revolution

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Industrial Revolutions. While the emergence of the first industrial revolution is inextricably linked to steam-fueled engines, the second by steel, oil and electricity and the third by digital technology, the fourth industrial revolution is characterized by merging technologies in vast and varied fields. There is no doubt that the first three revolutions had enormous economic ramifications in urban settings; however, there is universal agreement amongst experts that the fourth is causing unprecedented unemployment on a worldwide scale. The World Bank 2016 report found that the implementation of new technology will destroy some 5 million jobs in 15 industrialized and developing countries by 2020; in other words, cyber technology will make two-thirds of all jobs in the developing world redundant within a three-year period¹. Though humanity seems to be, by its own design and volition, inexorably marching towards the edge of a cliff, soon to disappear into the crevices of robotics, the solution offered by economic analysts themselves is an extensive and varied education². In effect, the jobs being destroyed by new technology are those requiring routine and physical tasks, while the types of jobs being created tend to require higher levels of education and specialized study³. As educators, our job is, then, to help our students become highly-skilled critical thinkers who know how to work collaboratively and cooperatively and who can adapt to the fast-changing environments this merging technology is creating. Curriculums planned through projects within the Phenomenon-Based Learning structure and taught

¹ World Development Report 2016, 'Digital Dividends', 102725.

² Forbes, 11 April, 2016

³ World Economic Forum, 19 January 2016

through the Content and Language Integrated Learning approach (CLIL), generate this spontaneous and autonomous environment that help ignite our students' interests and prepare them for the skills needed for the emerging work force.

Up-to-date research that supports these findings

For the past 20 years, Noriko Arai, Director of the Research Department of the University of Tokyo and founder of the Research Institute of Science for Education has been studying the limits of artificial intelligence in her aim to further the understanding of human thought. In early 2017, after examining the results of exams given both to university students and robots, Arai and her team were fascinated and disturbed by the results: robots, which can only rely on logic and mathematics to answer questions, performed higher than their human counterparts not only in multiple choice questions but in those requiring the linking together of information from multiple sources. Determined to uncover the reason for this incongruity, Arai discovered that most students today are not taught to think critically, make inferences or to develop comprehension skills. This leaves them at a great disadvantage in an age in which machines are already able to outperform humans not only in physical labor but in office jobs as well. Upon considering the ramifications of these findings, Dr. Arai's concludes that: 'it is essential that we take the steps to make sure our students are more intelligent than artificial intelligence'⁴, namely by helping them to develop analytic thinking, to become adept at extracting meaning and to cultivate interpersonal skills.

The Content and Language Integrated Learning (CLIL) approach helps to prepare students for the challenges of a new technological frontier

⁴ Arai, Noriko H. 'Reading Skill Test to Diagnose Basic Language Skills in Comparison to Machines', Research Map, 2017

Despite the hysteria fueled by the prolific imagination of Hollywood and other cinematic venues, artificial intelligence does have its limits and humanity still has the advantage. To keep this advantage, however, we need to provide the schooling that helps students to think in ways that machines – that rely on mathematic algorithms to reach conclusions - never can. Students given an education that includes problem-solving activities, interpersonal skills, multi-cultural perspectives, and above all, a strong multi-linguistic foundation, will still have a strong future in the global market.

The CLIL approach creates a structure that incorporates all this and more; it is a fusion between content and language and encourages independent and cooperative learning while building common purpose for lifelong development. The CLIL strategy, which can and has been used in primary, secondary and vocational classes with irrefutably positive results - involves teaching through a language – one that is not the majority communication vehicle of the school - as the medium of instruction and learning. It is strong because it gives teachers a platform for offering holistic education, competence-based learning, learner autonomy, fostering creativity and critical thinking, changing curriculum on *how* to learn (not *what* to learn) and recognizing the relevance and impact technology has on the lives of our students.

CLIL can be understood through its five major components: 1) Content (specific content taken from Learning Standards and Learning Objectives), 2) Communication (scaffolding of vocabulary, grammatical structures, functional and academic language), 3) Cognition (critical thinking, thinking frameworks), 4) Competences (language knowledge, planning, cooperation, learner needs, interaction, cultural awareness, evaluation, development, subject knowledge), and 5) Community (local, national and global community)⁵.

⁵ Marsh, et al. *Uncovering CLIL*, 2008

All learners need, at some point in their educational journey, need help in assimilating new material and so scaffolding is a key element in the CLIL approach. Closely aligned to the concept of Zone of Proximal Development, scaffolding is a powerful tool for learning. It is a type of pre-teaching, of chunking material into understandable blocks, to help students to lower their anxiety level and be more open and engaged in learning so that they can continue moving forward. Scaffolding techniques are numerous and varied and can be different types of decoding devices, mnemonic strategies, combining visuals and text, graphic organizers, etc., any activity that supports learning, learning about languages and learning through languages.⁶

The CLIL approach as the foundation for planning Phenomenon-Based Learning projects

With the CLIL approach as its foundation, Phenomenon-Based Learning has an interdisciplinary and multi-cultural focus. Students design, plan, and produce publicly-exhibited output through problem-based tasks in a bilingual/multilingual environment. Just as in the CLIL approach, the medium of communication is ideally any language other than the majority language of the school; however, to help students to be more competitive in today's global environment, English is considered to be the optimum language of interaction.

The first steps to planning a Phenomenon-Based Learning project

Although it may be one of the more challenging structures to use, Phenomenon-Based Learning creates an incomparable atmosphere of dynamic and exponential learning. Unlike a more traditional and straight-forward model, the process of creating PBL projects is not linear; each has a bearing on and affects the other. The Enquiry Question, for instance, designed to excited learners about the topic, launches the project

⁶ Fields, *101 Scaffolding Techniques for Language Teaching and Learning*, 2017

and establishes an environment of inquiry yet is inextricably tied to the Learning Standards and as such, needs to be developed simultaneously. In the same light, Learning Objectives personalize the Learning Standards, but can be just as easily outlined beforehand. Regardless of timing, Learning Objectives are not complete until the Exhibition (Final Presentation) is outlined, as they need to reflect the skills expected to be mastered in this final output.

Key elements that make a Phenomenon-Based Learning project different from other models

Once these basic elements have been established, the process is then extended and enhanced through the inclusion of scaffolding, thinking frameworks and formative assessments. Scaffolding helps students to transition into new material with more support so that they assimilate the information more deeply. Thinking frameworks give students different structures with which they explore an issue from all angles. Formative assessments help teachers and learners become synchronized and verify or negate progress.

What truly sets this model apart and what helps students to become strong contenders in the new technological world that is unfolding, is the stress on interpersonal skills, the expectation of excellence in all production and the opportunity to communicate in another language. The interpersonal skill is a strength that will definitively separate the participants of a PBL project from their artificial counterparts and one that is indispensable at a management level - a ranking unlikely to be touched by machines in the near or distant future. When excellence is demanded, learners adopt this expectation as a personal credo that will translate into all aspects of their lives and ultimately distinguish them from the other candidates in the work force. Finally, students working to communicate from a wide variety of perspectives and in diverse

situations, all in the context of a bilingual/multi-lingual environment, means that they will gain the very skills needed to become viable and desirable candidates in today's global market.

[1] World Development Report 2016, 'Digital Dividends', 102725.

[2] Forbes, 11 April, 2016

[3] World Economic Forum, 19 January 2016

[4] Arai, Noriko H. 'Reading Skill Test to Diagnose Basic Language Skills in Comparison to Machines', Research Map, 2017

[5] Marsh, et al. Uncovering CLIL, 2008

[6] Fields, 101 Scaffolding Techniques for Language Teaching and Learning, 2017