# The Deployment Problem of Problem Based Learning

## *Academic Transformation too can be Digitally Enabled*

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*The daily life of engineers is about solving problems with no predefined solution. This requires producing relevant context intelligence, mobilizing knowledge that is usually not immediately available, modeling and validating an innovative solution and assembling the constituents of its implementation. With the legitimate goal of developing the capabilities, aptitudes and attitudes to perform such activity, Problem Based Learning (PBL) is not naturally facilitated by traditional educational processes. Its deployment may require profound changes in the DNA of our engineering education systems. If problem solving is the core activity of industry, one can imagine that businesses have developed various instruments over time, to make it happen as efficiently as possible. Among such instruments is the use of digital tools and practices to enable problem solving in a collaborative manner and across the various disciplines involved throughout the value chain. Why would educators not consider such tools and practices to facilitate, among other transformative instruments, to facilitate their own PBL transition?*

## 1. Industry evolution towards experiential innovation

Competitive pressures and the need for many national industries to focus on high value productions have driven a fundamental shift in innovation towards the creation of products, services and, increasingly, a combination of both to provide prospective consumers with a distinctive experience of use. Over the last decade, in a constant dialog with various industries, Dassault Systèmes has literally reinvented its product line to make it a platform for the collaborative engineering of experiences, not just products;

the 3DEXPERIENCE platform. This translated into a broad set of applications that connect the context where innovation has to happen and the future solution to be engineered. Such platform provides a comprehensive communication and modeling environment in which various dispersed stakeholders, including the future final user, operate as an intelligent crowd to initiate and enrich innovative solutions. Results, produced on the cloud, take the form of a high fidelity computer image of such solution. Macro processes to get there can be classified in three broad categories:

- INSPIRE: Determine and analyze the global, socio-technical, economic and environmental context of the problem to solve. This includes semantic search, dashboarding and alerts about the relevant activity on the worldwide web or on private data sources. It provides a comprehensive, dynamic, multi-source, multi-dimensional, multi-media ideation stimulus to all project members.
- INNOVATE: In conjunction with relevant sources of inspiration, collectively produce ideas, model them in any digital form (text, pictures, videos, animations) and, by sharing them instantly with possibly dispersed team members, converge toward a preferred solution concept. Unlike traditional brainstorming settings, this instrument is i) dispersed in various locations, ii) persistent: formulated ideas remain modeled in the system for potential later consideration even if deselected and iii) connected to the elements of context that inspired individual ideas, the dynamic evolution of those element being potentially additional stimuli to enrich the targeted solution.
- CREATE: The targeted solution and its possible variations being formulated, it now needs to be technically defined for all stages of its subsequent lifecycle. This reflects the more traditional activities of product and process engineering, strongly augmented by collaborative capabilities and multi-disciplinary models of a future product and its use cases. Formal processes for technical and social collaboration support this work and the resulting computer model reflects the function, the 3D appearance and the multi-physics behaviors of the solution. Interdependences with the inspiration context and with the ideation history are maintained for continuous tradeoffs.

## 2. Turning a problem solving platform into a digital framework for problem-based learning.

Enabling students to experience innovation activities along these macro-processes with the tools and practices involved, is the very purpose of a learning project. This is why Dassault Systèmes Learning Lab has developed a customization of the 3DEXPERIENCE platform to produce an integrated ePBL framework that replicates these macro-processes with two specific educational additions: **I**NSPIRE, ***L****EARN,* **I**NNOVATE, **C**REATE, ***E****VALUATE. ("ILICE")*

- The LEARN section is the digital window on formal and informal learning resources including internal and external learning material, community based and peer learning, learning path monitoring, and self-training on operating the entire framework.
- The EVALUATE section provides instruments for students and educators to individually and collectively monitor learning activities and to assess their applications in the project work by unambiguously associating each project deliverable to its author(s).

LEARN and EVALUATE, can happen anytime during the project, in a non-co-located manner. Data produced during these macro-processes can keep track whenever relevant, with the associated elements of the INSPIRE, INNOVATE and CREATE environments. Persistent project memory also makes the framework an appropriate instrument of multi-year projects to experience practices of continuous improvement and impact control of team turnover.

## 3. Instant activation

While initially inspired by PBL and CDIO, the ILICE framework can accommodate with any project based methodology. It is currently being used in several ongoing projects in higher and secondary education, in single classrooms and internationally dispersed partnering institutions as well. Fully customizable by educators the framework can be activated by any user of the 3DEXPERIENCE platform and is provided upon simple request at: http://academy.3ds.com/lab/

ILICE on video


ACADEMY.3DS.COM