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Education, Design and Practice

Understanding skills in a Complex World

AMPS CONFERENCE 17.1

Education, Design and Practice – Understanding skills in a Complex World.

Stevens Institute of Technology, AMPS, PARADE, Architecture_MPS.

17—19 June, 2019

Education, Design and Practice – Understanding skills in a Complex World.

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INTRODUCTION

This publication is the product of the conference *Education, Design and Practice – Understanding skills in a Complex World* held at Stevens Institute of Technology in 2019. The keynote speaker was Peggy Deamer, Yale University. The call upon which the conference and this publication are based argues that:

The relationship between education and practice in any discipline is complex. In an ever changing world, it is also in flux. In a context such as the built environment, it is also interdisciplinary. Today, educators in the liberal arts still identify learning as an end unto itself, and designers still draw on ideas about intuitive knowledge. By contrast, the businesses behind urban development or city and regional growth call for graduates armed with the skills required in practice from day one. At the same time local government and cultural or city management firms need creative thinkers capable of continual adaptation. In the industries and sectors such as construction, transport and engineering, managers focus on a foundational baseline and value engineers and designers as both pragmatic problem solvers and visionaries.

These alternative perspectives have been reflected in multiple changes to the practice and structure of the education sector. One such example was the Boyer-Mitgang report which restructured architectural education in the US to reflect other professions. As in other areas, it resulted in a ‘degree arms race’, with MAs and doctoral programs multiplying more rapidly than the research and teaching methods they required. At the same time, the ‘widening participation’ agenda produced an explosion of research and funding for new pedagogical approaches and initiatives. Attempts to fuse education with the creative arts, industry and business through university led partnership schemes also proliferated. More recently, changes in the financing of the HE sector in places like the UK, mean universities now stress educational efficiency and guarantees of graduate jobs.

Working within this context, educators in sectors connected with the design, management and construction of the built environment have developed new and innovative ways to teach, they have embedded collaborative practices into their pedagogy, have forged unique partnerships across disciplines and outside the academy, and much more. However, research into best practice learning and teaching in the classroom is still evolving and educational initiatives can sometimes be seen as contradicting on-the-job realities in practice. The *Education, Design and Practice* conference publication explores this complex and contradictory scenario from multiple perspectives.

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TRAINING FOR KNOWLEDGE TO ACTION: TOOLS FOR THE METROPOLITAN ARCHITECTURE DISCIPLINE

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THE FOUNDATION OF THE METROPOLITAN DISCIPLINE

We call on leaders of public opinion, on educators, on all interested bodies to contribute to an increased public awareness of both the origins and the severity of the critical situation facing mankind today. Each person has the right to understand fully the nature of the system of which [s]he is a part, as a producer, as a consumer, as one among the billions populating the earth¹.

We consider the goal set by the Cocoyoc Declaration of 1974 as the goal of every action. It inspires the outline of the training programme we are building and testing within the TELLme – Training for Education, Learning and Leadership towards a new Metropolitan discipline, which is a Strategic Partnership for Higher Education ongoing project, co-financed by the EU Commission within the Erasmus+ programme.

The Metropolitan Discipline – whose foundation is the main objective of TELLme – aims to provide answers to the extreme urbanization and its phenomena. Given the complexity of its subject, the fragmentation, diversification of territories and environments, and the multiplicity of stakeholders, the Discipline is conceived as a “discipline of practise”, in which the theory is fed by the practise and its practise-led research is connected to a continuous experimentation on concrete case studies.

This position of the Metropolitan Discipline requests a wider reflection on knowledge and its connection with action. While this connection is always crucial – and it has been stated when the EU was called a “knowledge based” society – it is particularly the case for the Metropolitan Discipline, both because it explicitly addresses policy makers and all the stakeholders that “build” the city, and because the communities can find tools – particularly the maps – empowering their capacity to take part in the decision making processes.

In fact, the question of “action” – which refers to a deeper question on what is left to action in the age of technology – is elicited throughout the project, as well as politics, being the “political” dimension, which is linked to action.

This is the first and main challenge for a training programme: to train to a discipline whose theory is built on the practise, and the practise is shaped by the theory.

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SKILLS, ATTITUDES AND VALUES AT THE CORE OF THE LEARNING PROCESS

The crucial importance of “practice” implies the need for training in competences, in knowing how as well as in knowing that. For producing a metropolitan project, participation and consensus are as important as the project itself, due to the many different groups of stakeholders involved. Flexibility, cooperation, interdisciplinary and systemic thinking are mandatory, advancing from the dominant situation of disciplinary separation, leading to work in silos. A metropolitan project is linked to the analysis of vocations and expectations of the region of which a metropolis is the expression. A metropolitan project is a matter of localizing investments with a social impact in order to define an integrated and sustainable development, a new pact between local citizens and migrants and between this new community and the territory. It also calls for the need of highlighting the many values that can be read in the history of the territory and that can be put into motion, in order to qualify new centralities.

The training process aims to allow the participants to achieve awareness of the need for a metropolitan vision and to develop skills and ability to operate in the complexity linked to the size of the contemporary metropolis. This "metropolitan" competence is obtained with the integration of managerial skills with architectural and urban skills, capable of extracting the metropolitan gaps and needs of each metropolis, of defining the metropolitan operations that each metropolis needs to overcome the gaps and respond to its needs.

TRAINING FOR EVALUATING AND CREATING

Knowledge Dimension	Cognitive Process Dimension					
	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual Knowledge						
Conceptual Knowledge						
Procedural Knowledge						
Metacognitive Knowledge						

Figure 1. The table is taken from Anderson and Krathwohl (2001).

The TELLme Training works on the higher levels of the cognitive processes implied in the different knowledge dimensions framed in the Anderson and Krathwohl (2001) revision of the Bloom’s taxonomy². In fact, the main and most significant revision is about the knowledge dimension: “knowledge” is taken out of the cognitive domain and added as a separate dimension, recognizing four distinct knowledge dimensions (factual, conceptual, procedural and metacognitive). The table below shows that – instead of six ways to think about one type of knowledge, as in the Bloom’s Taxonomy – there are now six ways to think (Cognitive Process Dimension) about four distinct types of knowledge (Knowledge Dimension).

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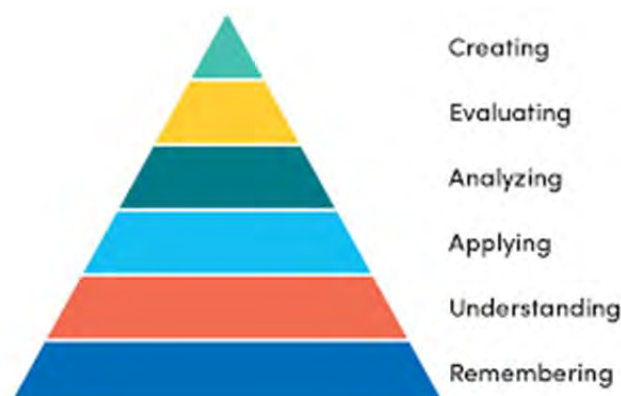


Figure 2. A representation of the six cognitive process dimensions in the form of pyramid, implying that the higher levels are built on the lower ones.

Among the recurring thinking activities at stake in the TELLme trainings we can list: planning, negotiating, deciding, judging, choosing, assessing, mapping, interpreting, testing... they all refer to the higher levels of the cognitive processes of the revised bloom's taxonomy, which are "creating" and "evaluating".

The training addresses this need both in the consideration of the admission requirements of the participants and in the adoption of the flipped classroom pedagogy³ among the pivotal references of its learning methodology. Against this pedagogy a set of video-courses on the Cartography were produced⁴.

TRAINING THROUGH IMPLEMENTATION TOOLS

The conception of the metropolitan discipline originates from the investigation of the existing situation analysis of the metropolises in the five countries involved in the project (Italy, Spain, Slovenia, Mexico, Argentina). The research produced the development of a conceptual theoretical framework and a methodology, together with a vast array of implementation tools⁵, consistently with a research which is in itself already practice led.

Drawing from the implementation studies (mainly focussing on health care, where the issue of immediate translating of research into practice is literally a vital concern) and adapting the wording to our context, implementation might be defined as the process of putting to use or integrating research and new practices within a setting⁶.

TELLme tools are meant to accompany the process of translating research into practice and therefore they can be considered as "process models"⁷ since they explicitly take a process perspective of implementation, recognising "a temporal sequence of implementation endeavours"⁸.

The cartography is the groundwork tool – together with the hub, which is a "hard tool" – developed by the project on which all its practical tools are built. In fact, every map is conceived as a semantic package connected both to the theoretical framework and to data. In this sense, the maps are the tool and the medium for connecting the theory to the practise, and for understanding and reading the territory according to the theoretical principles and concepts⁹.

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TELLME GLOSSARY AND GLOSSARY SOFTWARE AS THE MAIN TOOLS

Since its inception, the TELLme project deemed necessary to produce a Glossary, as an attempt to allay confusion and misunderstanding. In fact, the need for a Glossary¹⁰ as a fundamental tool of mutual understanding and clarification was strengthened by the TELLme Training Lab held in Guadalajara in February 2019 and in the many occasions in which the TELLme approach and results were presented to the stakeholders. The Metropolitan Discipline refers to a field in which targets and stakeholders involved belong to different environments (Higher Education Institutions, policy makers, NGOs, multilaterals, etc.). Moreover, TELLme – beside its international partnership – directly addresses the transnational dimension, and relies therefore on the use of a common language, which is English, through which the different national terminologies are translated. The way to unravel the tangle the Glossary took was to try to explain the meanings of the terms in the context of the Metropolitan Discipline.

The Glossary Software enables the visualisation of the relations between the Glossary keywords, fully exploiting the richness of meanings, comments, references and images and producing Semantic Maps of the Metropolitan concepts.

The TELLme Glossary Software¹¹ is conceived as a bridge connecting the theoretical framework of the Discipline and the Cartography Hub, which is a digital platform the project built for producing and storing maps. The Glossary Software was therefore developed adding to the Discipline a transversal tool that substantiates the link between all TELLme outputs, thus becoming crucial for the training activities.

STAKEHOLDERS MAP: ARCHITECTURE OF THE JOINT

The issue of governance is addressed through the creation of a stakeholders map that reflects the core values and the issue of the subject matter and balances the participation amongst the local and global metropolitan actors, and the metropolitan experts. The stakeholders bring the relevant topics on the table of the TELLme training, to be discussed following the Metro-dology.

The Metro-dology begins with three phases: the problem finding, the problem setting and the problem solving. In fact, the production of a metropolitan project requires an agreement between different metropolitan actors. This agreement can be reached in different ways, corresponding to different theories and forms of stakeholder aggregation¹². Almost all complex agreements are made up of many parts that require connexions. The objective of “modular tables” is not necessarily to limit the total number of stakeholders and the rules of their interface on a given table. Instead, the focus is on geography and, therefore, on the position of the individual actors and the reasons that can unify them. The least desirable place to unite stakeholders is the final meeting point at the end of the decision-making process. The theory of dialogue was once hierarchical, with most of the actors united in the place of the final decision. The theory was that a control structure would ensure the social quality and manage the costs of the metropolitan work, keeping as many agreements as possible under the direct control of the final decision-maker: the politician.

In the contemporary theory and practice that recognize the essentially chaotic nature of the agreement in complex projects, the focus is instead on disassembling the process into small groups of integrated tables (a module). These smaller tables can then be designed and managed independently, as tables composed of separate teams focused exclusively on a part of the overall project. Quality control can be managed incrementally, one module at a time, with corrections made before the final decision. That is the art of listening and joining.

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The matrix mathematics behind this agreement theory is powerful. Simply stated, the relationship between the number of stakeholders and the potential interfaces between them is exponential: two stakeholders have a single interface (2:1), 4 stakeholders have 4 possible interfaces (1:1) and 16 generate 24 potential interfaces between these parties (2:3). Each of these interfaces between two of its stakeholders is an agreement, in equal measure, an opportunity for both the positive and negative result.

When we carry out any project, we tend to focus on the actors and their characteristics, producing a catalogue of necessities. However, there is no comparable catalogue of interfaces, but their potential number exceeds that of the disciplinary themes of an ever-increasing exponential relationship. The amount of energy and time needed to solve all the problems of relationship in the design and agreement construction of any metropolitan artefact is staggering.

First, each agreement determined is in itself a problem: the civil servant within the metropolitan expert define the problem and ask the questions. The objectives for the solution and the constraints that the “agreement interface” must satisfy are identified. Each interface therefore requires an act of design both for selection and for custom design of the agreement. Each of these potential interfaces between the parties must be developed. However, the number of type changes required is considerable.

Usually the solution was found in the mathematics of the agreement. Now every connection between stakeholders is a matter of listening, a matter very similar to a very accurate craftsmanship. Each of the possible permutations must be carefully thought out and implemented within a certain time limit. The mere willingness of the parties to reach the final agreement is not only a logistical fact, but a profound understanding of the values behind the different interests and investments. Deficiencies in quality in bureaucratic agreement method are inevitable, if they are only issues of productivity and cost.

If more actors generate more agreements exponentially, then the opposite is also true: fewer actors generate fewer agreements exponentially. There are two possible solutions: to fragment the process of agreement or to reduce the number of actors. A reduction of actors requires a complete redesign of the project’s parts themselves. It is more difficult and takes more time to test actors than to redesign the process. Since time is an expensive commodity, most facilitators have focused first of all on the fragmentation of the process of designing agreements for discrete tables: sectors, small inter-sectors tables, large decision tables. These are composed of a series of stakeholders similar to the ones before, simply moving back the process. The problem of the agreement is not solved, but it moves to another place and time, it moves to another location.

The changed place in term of table/decision making level, however, is a significant part of the solution. A very complex problem turns into a series of smaller and less complex problems. The resolution of the project can be more targeted. And there is less complexity to deal with in the final agreement process. However, there is a new central design issue that concerns how to combine small inter-sector tables, large decision tables and the scale of sectors. In this world of modular design, agreements between metropolitan actors are no longer simply a solution to that single problem. They are now so much, or more, a matter of shared values in the decision-making chain where decisions must now be parallel. We are talking about a decision-making chain, but it is no longer a mechanical process, as we have already seen, but a process of sharing and listening.

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CONCLUDING REMARKS

According to TELLme, the metropolitan discipline is based on a knowledge to action learning process, requiring tools, both for training purposes and for its application in the life of metropolis planning and management. A variety of tools – from maps, glossary, digital platform, stakeholders map – were produced and tested. We believe that for enabling decision making on the metropolitan scale, every city needs instruments that helps policy-maker to define objectives based on SDGs and their impact indicators.

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¹ The Cocoyoc Declaration, 1974. On the 8-12 October 1974 a symposium on “Patterns of Resource Use, Environment and Development Strategies” was convened in Cocoyoc, Mexico by Maurice Strong and Gamani Corea, the directors of United Nations Environment Programme and the United Nations Conference on Trade and Development. The participants adopted The Cocoyoc Declaration.

² Benjamin S Bloom; Engelhart Max D.; Furst Edward J; Walker H. Hill;. Krathwohl David R, Taxonomy of educational objectives: The classification of educational goals. In *Handbook I: Cognitive domain*, 1956, New York, David McKay Company. Bloom’s Taxonomy is one of the most recognized and used educational tools, proposing a hierarchy of types of thinking—from recall to analysis and synthesis. In 2001 a revision of the Bloom’s Taxonomy was published by a research team led by Lorin Anderson, who worked closely with Bloom on the original version: Anderson Lorin W., Krathwohl David R., Airasian Peter W., Cruikshank Kathleen A., Mayer Richard E., Pintrich Paul R., Raths James, Wittrock Merlin C., A taxonomy for learning, teaching, and assessing: A revision of Bloom’s Taxonomy of Educational Objectives, 2001, New York Longman.

³ The expression “flipped classroom” refers basically to a learning process in which tasks are assigned to students in order to cover material prior to the class meeting. During class meeting, teaching can be highly interactive through questions and answers, exercises, applications and case studies. As references we can mention Eric Mazur, Peer Instruction: A User’s Manual, 1997, Prentice Hall ; Lage Maureen J., Platt Glenn J. and Treglia Michael, “Inverting the Classroom: A Gateway to Creating an Inclusive Learning Environment”, in *The Journal of Economic Education*, Vol. 31, No. 1, pp. 30-43, Winter, 2000.

⁴ See https://www.youtube.com/watch?v=ikNegzqbFM&list=PL5mxbfx_mti_RHZg5oRvHdR4cPsVZASJZ and www.metropolitancartography.org _ passphrase: the arts are learnt by reason and method; they are mastered by practice.

⁵ On the importance of tools and toolkits in implementation, see Brownson Ross C., Proctor Enola K., Luke Douglas A., Baumann Ana A., Mackenzie Staub, Brown Matthew T.& Johnson Mallory, Building capacity for dissemination and implementation research: one university’s experience, in *Implementation Science* volume 12, Article number: 104, 2017.

⁶ See Borsika A. Rabin, Brownson Ross C., Haire Joshu Debra, Kreuter Matthew W., and Weaver Nancy L., A Glossary for Dissemination and Implementation Research in *Health, Journal of Public Health Management and Practice*, 14 (2), 117–123, 2008.

⁷ Process models (or frameworks) “specify steps (stages, phases) in the process of translating research into practice, including the implementation and use of research. The aim of process models is to describe and/or guide the process of translating research into practice. An action model is a type of process model that provides practical guidance in the planning and execution of implementation endeavours and/or implementation strategies to facilitate implementation”, Nilsen Per, Making sense of implementation theories, models and frameworks, in *Implementation Science* volume 10, Article number: 53, 2015.

⁸ Ibid.

⁹ Maps plays also the relevant function of communicating, translating and sharing knowledge and thought.

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¹⁰ Relevant reflections on the confusion dispelling power of glossaries are in Graham Ian D.; Logan Jo; Harrison, Margaret B.; Straus Sharon E.; Tetroe Jacqueline; Caswell Wenda; and Robinson Nicole, Lost in knowledge translation: time for a map?, in *The Journal of Continuing Education in the Health Professions, Volume 26, pp. 13–24, 2006.*

¹¹ www.tellme.polimi.it/tellme_apps/tellme

¹² In the past, agreements were mainly born from the relationships and the dimensional and economic limits of projects. A central aim of the concertation tables was the management of these interests. The relationships that separated even dissimilar interests and allowed the junction of similar interests that individually could not be produced if defined only at the urban scale.

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