A First Approach to the Representation of the Experiential Learning Practice on the Top of the Quintessence Kernel

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ABSTRACT

In the educational scenario, some methods are used for curriculum design. Despite such methods, a sample of documented experiences about curriculum design shows designers use their criteria, i.e., we have virtually as many methods as curriculum designers. Facing such a situation, we focus on identifying common practices within such methods of curriculum design. According to a systematic literature review, experiential learning is identified as a common practice from such experiences. In this paper, we use a common ground for curriculum design affairs based on a Quintessence kernel. Considering Quintessence kernel is defined as a set of concepts and relationships essential and present in any project endeavor, such a kernel is the first approach to represent common practices of curriculum design, and we start with the experiential learning practice. Within the constructivist pedagogical tends, experiential learning plays a leading role since it supports the development of the student knowledge, and it is included in all the curriculum design methods from our literature review. The contribution in this regard is based on exploring alternative ways of representing common practices in curriculum design from a project management perspective, which is the basis of the Quintessence kernel.

INTRODUCTION

Each academic program has a curriculum, which is designed according to the designer criteria. Some curriculum design methods are found by performing a systematic literature review; however, documented experiences on curriculum design for such academic programs are done in a non-standardized way. In this regard, we find some practices performed within the curriculum design methods with similarities; then, we call common practices to those that share some similarities regardless of the curriculum design method. Facing such a scenario, in this research we focus on a specific common practice, which is called experiential learning practice.

We use the Quintessence kernel to represent the experiential learning practice. The Quintessence kernel is a proposal based on the Essence kernel, and it is codified for a multidisciplinary project management theory. Such a kernel comprises alphas, activity spaces, and competencies, among other elements. In this regard, Quintessence is intended to define a multidisciplinary project management theory including all project management BOKs —Bodies of Knowledge— and standards (Henao, 2018).

The Quintessence kernel has some benefits, including scalability, extensibility, and usefulness. Such benefits have been inherited from its predecessor theory: The Essence. For this reason, we consider the usage of the Quintessence kernel is suitable to represent common practices for unifying concepts previously handled in a non-standardized way.

Experiential learning provides an opportunity to promote meaningful learning from self-exploration and experimentation, since it comprises concepts such as learning-by-doing, learning-by-experience, and hand-on learning. Despite its relevance, this common practice is used by different curriculum design methods with multiple shapes. Thus, we propose a first approach to represent the experiential learning practice in order to comply with the pedagogical foundations on which it is based.

This paper has six sections. First, we provide an explanation of the study context based on a systematic literature review. Then, we present some theoretical background in this regard. The third section contains the formulation of a first approach to

representing the experiential learning practice by using the Quintessence kernel. The fourth section has a description of the benefits of such a proposed solution. Conclusions are discussed in the fifth section. Finally, we propose future work from the present study in the last section.

STUDY CONTEXT

In the academic scenario, curriculum design is a common activity. The creation of academic programs has implicit the labor of curriculum design, no matter how such curriculums are designed. Akker (2003) introduces the concept of educational aspects to be

considered into a curriculum design. Such educational aspects are strictly related to curriculum products. Educational aspects are the essential components in the rationale about curriculum design.

Every single educational aspect is relevant in a curriculum design endeavor. Curriculum designers should raise some questions focused on the students for considering educational aspects: why are they learning? —rationale—, which goals are they learning towards? —aims and objectives—, what are they learning? —content—, how are they learning? —learning activities—, how is the professor facilitating their learning? —professor role—, what are they learning with? —materials and resources—, whom are they learning with? —grouping—, where are they learning? —location—, when are they learning? —time—, how their learning is assessed? —assessment.

In this research, we focus on how the students learn. Consequently, we identify a trend for generating learning spaces for students by using experimentation. Theoretical foundation for addressing learning by experimentation has more than a century of history from a curriculum design approach. In this way, systematic literature review is performed to notice some parts of the curriculum design methods from13 proposals involving experiential learning practices.

Considering the heterogeneity of the proposals for practices associated with experiential learning, we use a kernel for the definition of multidisciplinary process management called Quintessence as a reference (Henao, 2018). We take advantage of its benefits to make a first approach to the representation of practices related to experiential learning in the curriculum design scenario.

THEORETICAL BACKGROUND

We perform a systematic literature review on curriculum design methods in a 100-year time window in order to theoretically support our proposal. In such a review, we identify some practices with some common aspects. Among the identified common practices, we focus on those related to experiential learning. A sample of 13 proposed curriculum design methods with some elements related to experiential learning is depicted in exhibit 1.

According to such findings, experimentation for guiding student learning is founded for a century in curriculum design matters. However, curriculum designers use their own ways to include experiential learning despite well-documented and widely cited methods.

EXHIBIT 1
SAMPLE OF METHODS FOR CURRICULUM DESIGN
WITH PRACTICES RELATED TO EXPERIENTIAL LEARNING
(SOURCE: THE AUTHORS)

Method Authors	Part of the method related to Experiential Learning	Practice-related Statements
Kilpatrick (1918)	Executing	Doing project-based learning.
Rugg (1918)	Sequencing the experiences to achieve the objectives	Planning an experimental discovery for students.
Caswell and Campbell (1935)	Setting up activities	Proposing the activities according to the real learning environment.
Tyler (1949)	Selecting the learning experiences	Selecting learning experiences looking for the student satisfaction by practicing the behavior.
Smith, Stanley, and Shores (1957)	Selecting and ordering the learning experiences	Establishing a sequence of real experiences from simple to complex.
Taba (1962)	Selecting the learning experiences	Establishing the criteria for selecting learning experiences.
Kerr (1968)	Learning experiences	Proposing actual learning experiences considering the content and the actual context.
Nicholls and Nicholls (1972)	Selecting and organizing the learning experiences	Choosing the proper teaching strategies and learning experiences.
Stenhouse (1975)	Developing the learning strategies	Analyzing the criteria for worthwhile activities in the learning process.
Bruner (1977)	Selecting the large life experiences	Learning the essence of the culture for a well- educated citizenry.
Perkins (1998)	Performing the understanding	Guiding the student for the elaboration of conceptual structures based on experimentation.
Wiggins and McTighe (1999)	Planning learning experiences and instruction	Addressing learning toward real-life experiences.
Ornstein and Hunkins (2018)	Theoretical foundation	Promote an active role for students according to global expectations.

We start from the general definition of experiential learning proposed by Kolb (1984, p. 40), who states "the process of experiential learning can be described as a four-stage cycle involving four adaptive learning modes—concrete experience, reflective observation, abstract conceptualization, and active experimentation." His theoretical model is depicted in exhibit 2.

EXHIBIT 2
**KOLB'S EXPERIENTIAL LEARNING MODEL (DEMIRBAS & DEMIRKAN, 2004, p. 3)**
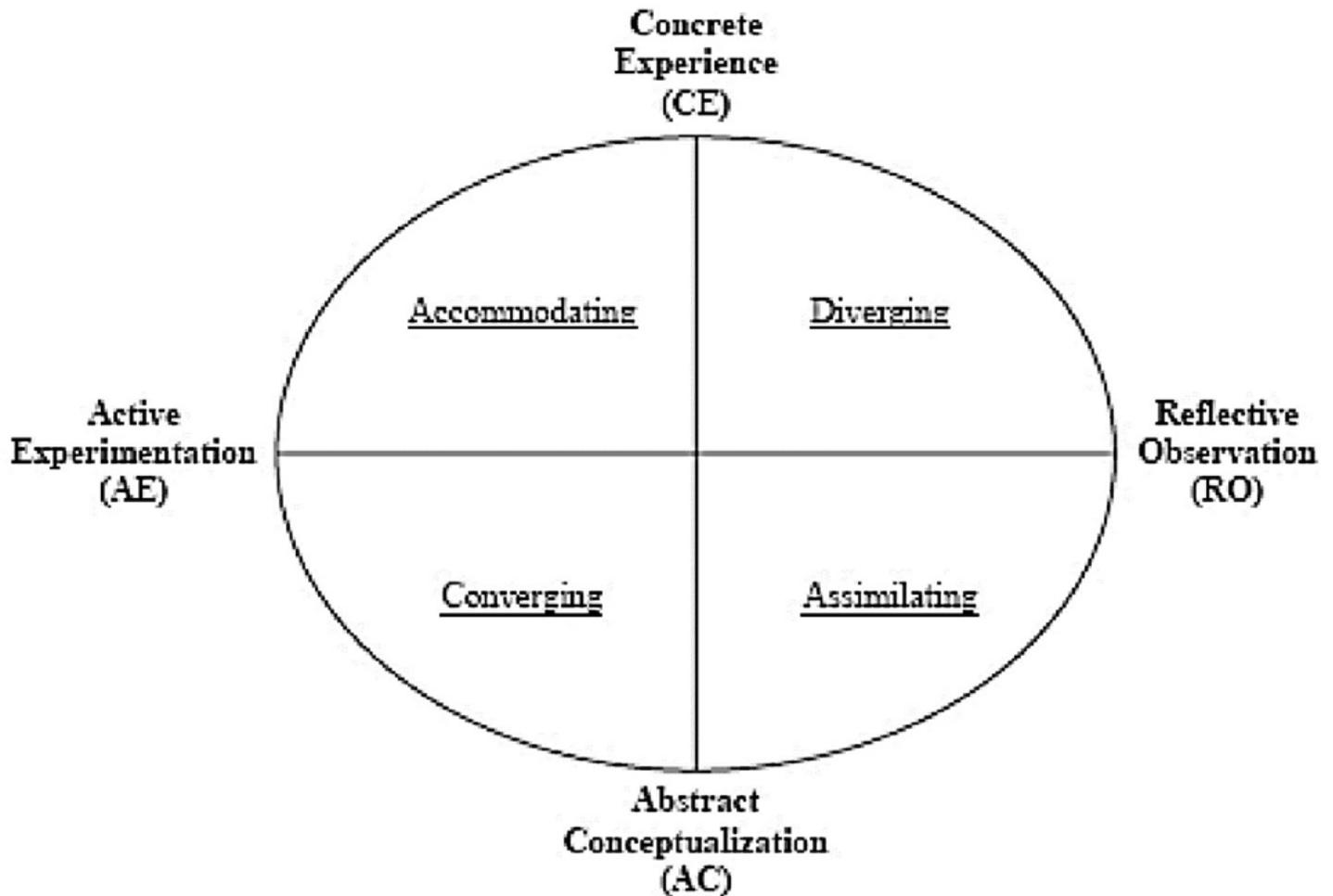
According to this model, four stages are highlighted in processes related to experiential learning. Each of the stages contains conceptual elements shared by some practices related to experiential learning. At this point, we establish a relationship between some experiential learning practices with the Kolb model; for that purpose, we use pre-conceptual schemas. Pre-conceptual schemas are aimed to represent knowledge by graphically following a well-defined semantics. According to Zapata (2007), a pre-conceptual schema is a way to specify structured ideas by using a controlled language. Besides, pre-conceptual schemas use a simple notation, they are easy to understand, and they are adaptable to any knowledge domain (Zapata, Arango, & Gelbukh, 2006). In this way, we depict the association of the definition of some experiential learning practices with the four stages proposed by Kolb by using the pre-conceptual schema of the exhibit 3.

Stage one is related to planning the learning experience. In this stage the curriculum designer —mostly professors—plans the learning experiences considering the student background. The curriculum designer states objectives. The second stage comprises the actual learning experience based on the proposed objectives. The third stage reflects what happens in actual scenarios, focusing on the learning experience itself. Discussions and briefings with the peers and the professor are part of this stage, focusing on abstracting relevant concepts. The last stage represents ongoing experimentation focusing on repetitions and skill development; so, the more the students perform the experience, the more they will learn.

EXPERIENTIAL LEARNING ON THE TOP OF QUINTESSENCE KERNEL

Quintessence kernel is suitable to solving the discipline-dependent vision introduced by some proposals related to project management. As a result, the Quintessence proposal is encoded as a kernel for project management in a multidisciplinary setting. Such a kernel includes Alphas, Activity Spaces, and Competencies. Alphas —stand for Abstract Level Progress Health Attributes—

EXHIBIT 3
DEFINITION OF SOME PRACTICES RELATED TO EXPERIENTIAL LEARNING WITHIN KOLB MODEL
(SOURCE: THE AUTHORS)
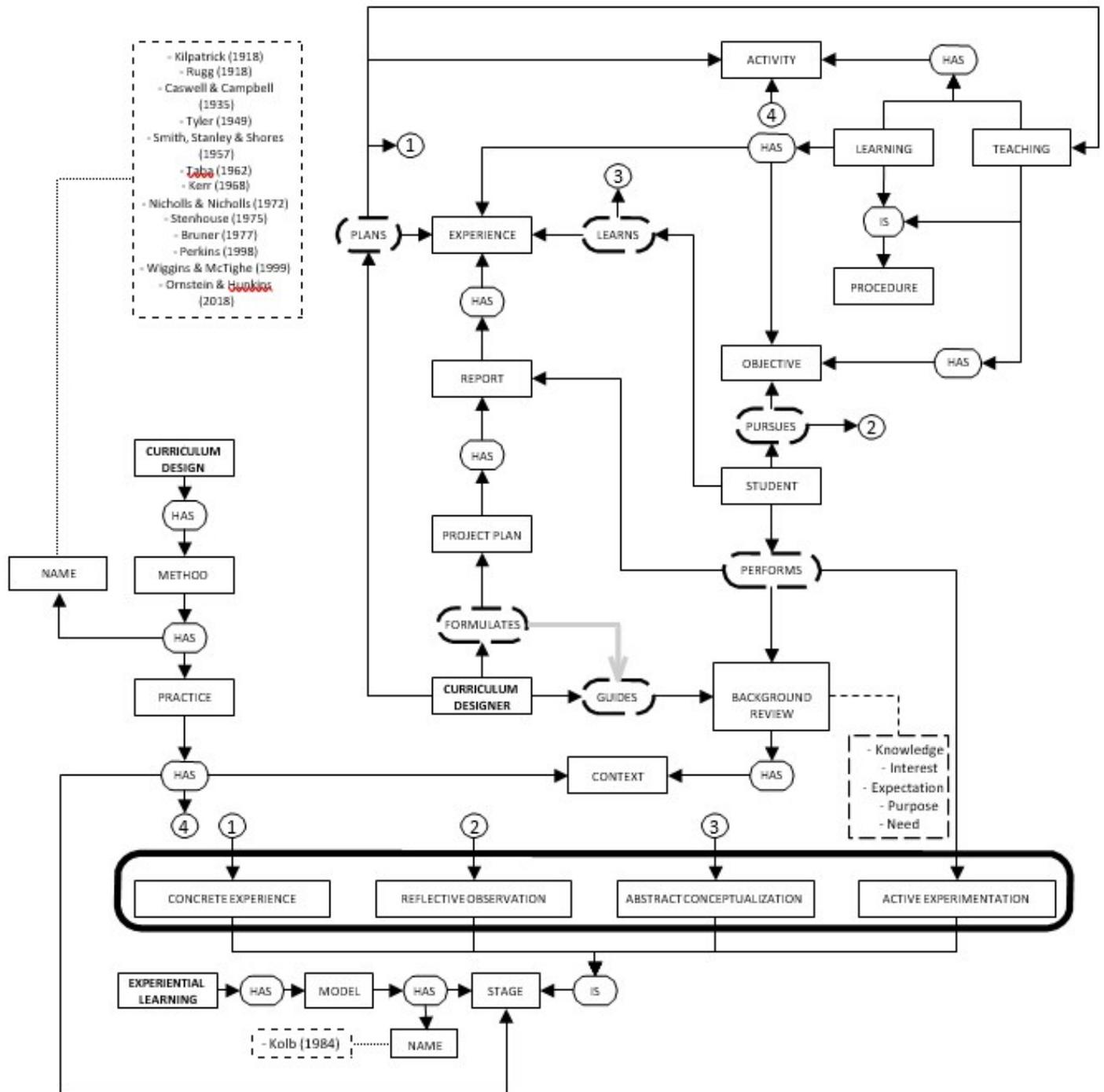
are used to describe the things practitioners should manage for controlling the environment where projects run; Activity Spaces represents the things practitioners should do when running a project; and Competencies represent the abilities, capabilities, and skills required for performing the work of software engineering endeavors (Henao, 2018). Areas of concern are represented by rounded rectangles; Alphas are represented by shapes based on the Greek character; Activity Spaces are represented by rectangular arrows with discontinuous borderline; and Competencies are represented by stars. Exhibit 4 depicts the elements of the Quintessence kernel.

Quintessence kernel includes three areas of concern in terms of project management in multidisciplinary settings: customer, solution, and endeavor. The areas of concern are associated with any project definition and execution scenarios regardless of its nature. For each area of concern, activity spaces have been defined, which are oriented by describing the common actions performed. According to the notation of the kernel, competencies are represented as stars. The use of colors corresponds to the type of element

EXHIBIT 4
ELEMENTS OF THE QUINTESSENCE KERNEL
(SOURCE: THE AUTHORS BASED ON (HENAO, 2018)
AND (DURANGO-VANEGAS, ZAPATA-RUEDA, & ZAPATA-JARAMILLO, 2019))
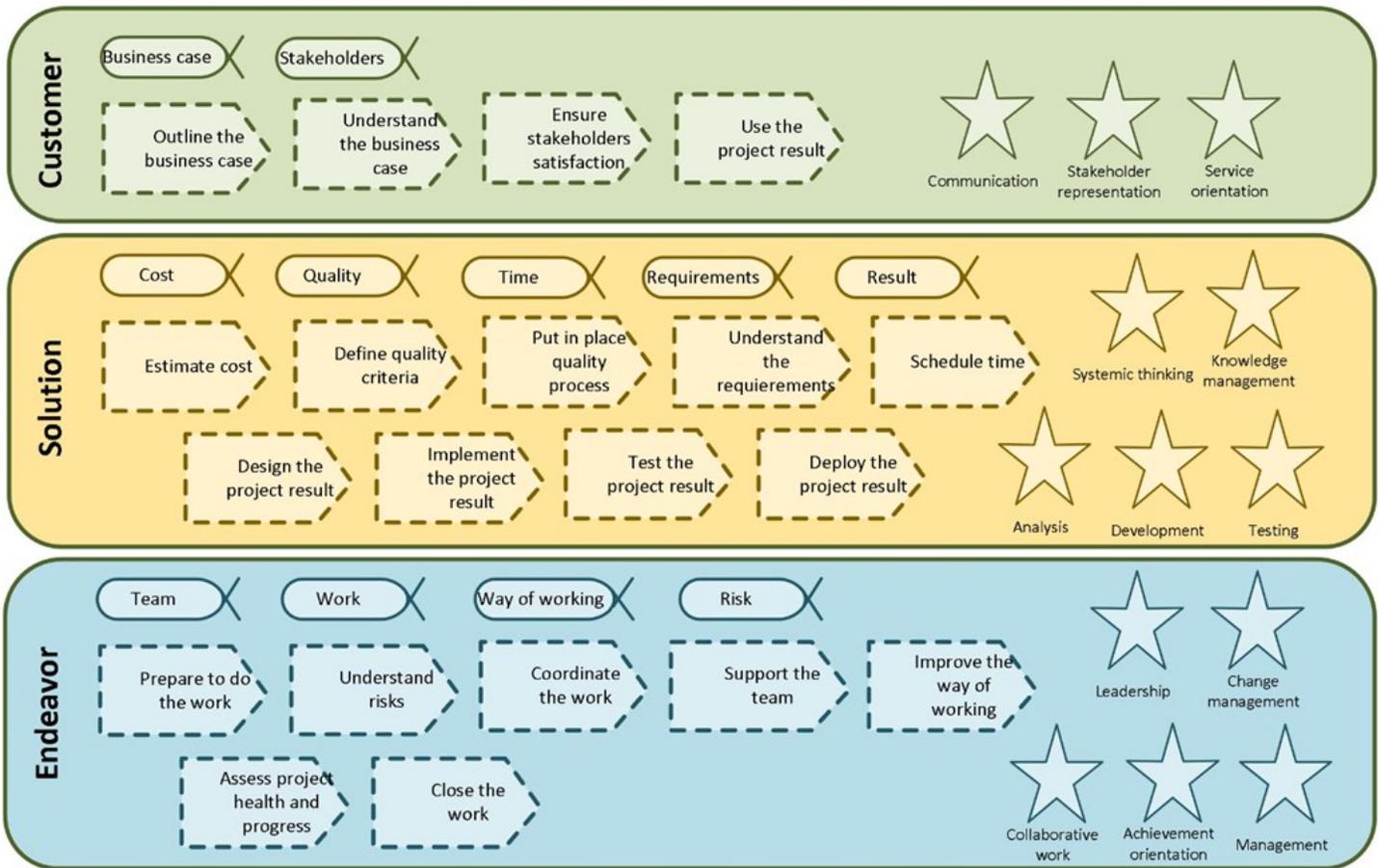
belonging to a particular area of concern.

In this vein, we recognize the Quintessence kernel as an adequate notation for representing a first approach towards common practices in curriculum design; in this case, we represent a common practice in curriculum design related to experiential learning. Based on the knowledge represented by using a pre-conceptual schema in exhibit 3, we represent a practice associated with the formulation of an in-classroom project based on experimentation. Such a practice is built from Kilpatrick (1918) and Ornstein and Hunkins (2018). Be advised that some common concepts are feasible to be articulated in a common practice called "Design of Learning based on Experience" as depicted in exhibit 5.

## HIGHLIGHTING SOME BENEFITS ABOUT THE REPRESENTATION

We consider that usage of the Quintessence kernel implies an alternative way for representing practices in the project management scenario. This research is about common practices related to experiential learning in curriculum design, and the Quintessence kernel is suitable for this task. We want to highlight its clear syntax and reduced symbology, making it easy to understand and adapt to any environment.

Another important aspect worth highlighting is the orientation towards thinking more in practice than in methods. The Quintessence kernel gives freedom to curriculum designer for expressing their designs without weaving strong ties with pre-established methods, when creating new practices or adapting existing practices for reuse.

A library of practices on experiential learning would ease the processes associated with curriculum design, speeding up implementing tasks within the classroom. This kind of library will help to maintain valuable information about specific experiences related to experiential learning.

CONCLUSIONS

EXHIBIT 5
REPRESENTATION OF A PRACTICE RELATED TO EXPERIENTIAL LEARNING
ON THE TOP OF THE QUINTESSENCE KERNEL ACCORDING TO THE KOLB MODEL
(SOURCE: THE AUTHORS)
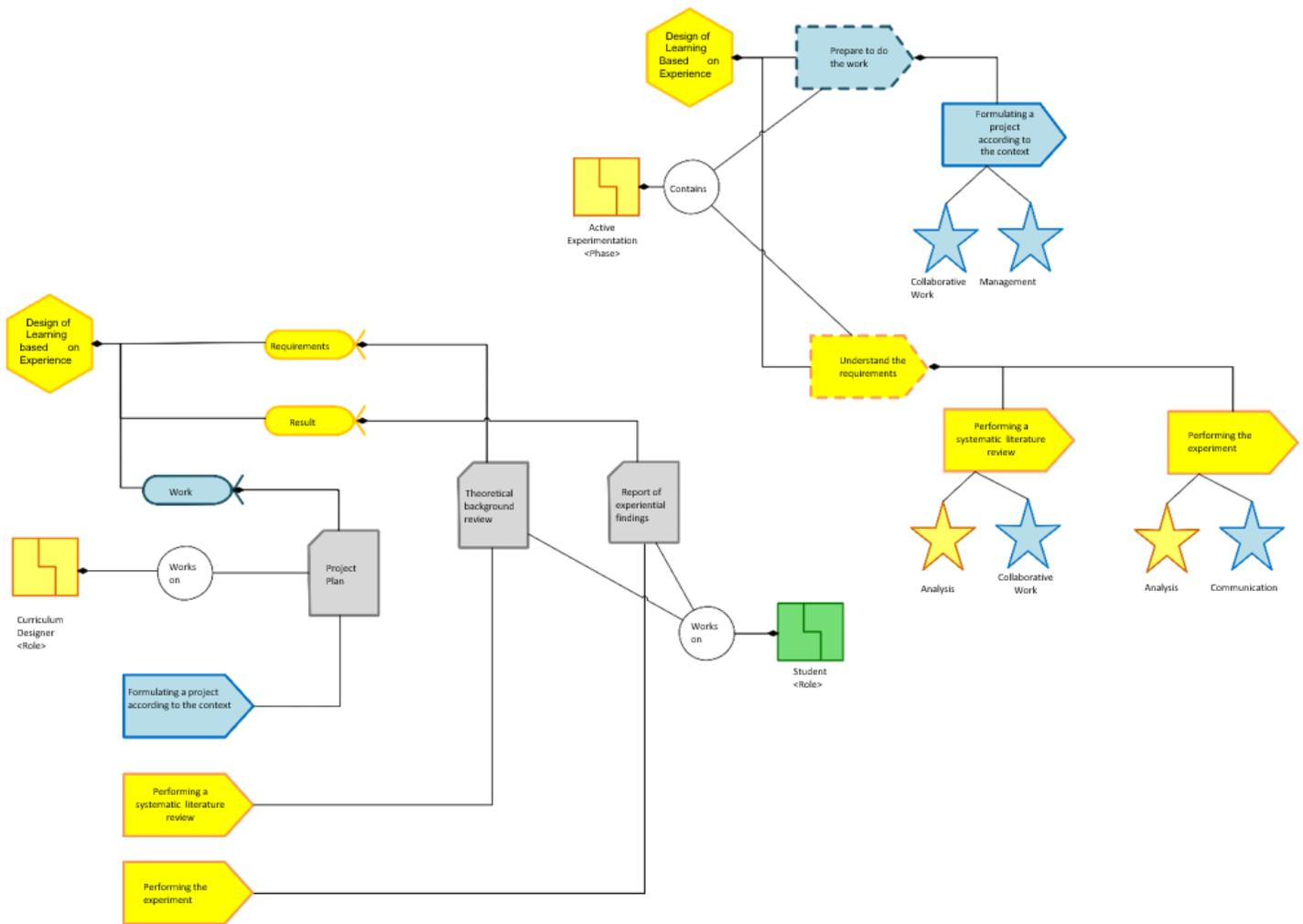
Quintessence kernel has great potential for the representation of practices regardless of the context where such practices are intended to be applied. Quintessence kernel was proposed in the project management scenario. However, this research demonstrates its easy adaptation in the curriculum design scenario. This feature is based on the concise semantics and the reduced syntax of the expressions of the language.

Common practices in curriculum design related to experiential learning represented on the top of the Quintessence kernel can be adapted to different contexts. The theory about experiential learning is part of the constructivist paradigm in educational sciences. For this reason, promoting the use of experiential learning practices contributes to the development of meaningful learning in students.

Given the Quintessence kernel extensible capacity, curriculum designers have the advantage of proposing novelties enriching the elements of the language and the way it is used. In this sense, the Quintessence kernel can continue to grow and serve project management tasks in any application scenario.

FUTURE WORK

In this research, we only represented the experiential learning practices in the curriculum design scenario. We can test the Quintessence kernel usage in the representation of practices beyond project management and curriculum design. The possibilities of representing practices in any domain of knowledge on the top of the Quintessence kernel are growing.

REFERENCES

Akker, J. (2003). Curriculum perspectives: An introduction. In J. van den Akker, W. Kuiper & U. Hameyer (Eds.), Curriculum landscapes and trends. Dordrecht: Kluwer Academic Publishers.

Bruner, J. (1977). The Process of Education - A Landmark in Educational Theory (Issue 1). Cambridge, MA: Harvard University Press.

Caswell, H. & Campbell, D. (1935). Curriculum Development. New York: American Book Company.

Demirbas, O. & Demirkan, H. (2003). Focus on architectural design process through learning styles. Design Studies. 24(1), pp. 437-456.

Durango-Vanegas, C., Zapata-Rueda, C. & Zapata-Jaramillo, C. (2019). Representación en el Núcleo de la Esencia de Semat de las Competencias de un Equipo de Desarrollo de Software. Información Tecnológica. 30 (4), pp. 217-226.

Henao, A. (2018). Towards a theory for defining a project management multidisciplinary kernel: An approach based on Abstract Level Progress Health. (Master od Science Thesis). Universidad Nacional de Colombia, Medellín.

Kerr, J. (1968). Changing the curriculum. London: University of London Press.

Kilpatrick, W. (1918). The Project Method. The Use of the Purposeful Act in the Educative Process. New York: Columbia University press.

Kolb, D. (2014). Experiential learning: Experience as the source of learning and development. Upper Saddle River: Prentice- Hall.

Nicholls, A. & Nicholls, S. (1972). Developing a Curriculum - A practical Guide. Sidney: George Allen & Unwin Ltd.

Ornstein, A. & Hunkins, F. (2018). Curriculum: Foundations, Principles, and Issues. 7th Edition. Essex: Pearson Education Limited.

Perkins, D. (1998). The Teaching for Understanding Framework. The Teaching for Understanding Guide. San Francisco: Jossey-Bass, pp. 17–24.

Rugg, H. (1930). The Foundations of Curriculum-Making. New York: Arno Press.

Smith, O., Stanley, W., & Shores, J. (1957). Fundamentals of Curriculum Development. Chicago: World Book Company. Stenhouse, L. (1975). An Introduction to Curriculum Research and Development. Portsmouth: Heinemann Educational. Taba, H. (1962). Curriculum development: theory and practice. San Diego: Harcourt.

Tyler, R. (1949). Basic Principles of Curriculum and Instruction. In Basic Principles of Curriculum and Instruction. Chicago: The University of Chicago Press.

Wiggins, G. & McTighe, J. (1999). The Understanding by Design Handbook. Alexandria, VA: ASCD Association for Supervision and Curriculum Development.

Zapata, C., Arango, F. & Gelbukh, A. (2006). "Pre-conceptual Schema: a UML Isomorphism for Automatically Obtaining UML Conceptual Schemas," Lecture Notes in Computer Science. 4293(65), pp. 27–37.

Zapata, C. (2007). Definición de un esquema preconceptual para la obtención automática de esquemas conceptuales de UML. (Ph.D. Thesis). Universidad Nacional de Colombia, Medellín.