Poster: PBL Planner Toolkit

A Canvas-Based Tool for Planning PBL in Software Engineering Education

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ABSTRACT

The PBL (Problem-Based Learning) methodology provides many benefits to those who use it in teaching. In this light, it is important to plan well when using this methodology, efficient to the purposes established by an educator, in a way to avoid those vital aspects to educational planning in the PBL approach that are neglected or forgotten. However, there is a lack of specific tools to help educators in the task of planning their teaching, specifically geared to the PBL approach. As an alternative to this problem, this paper proposes a tool consisting of a Canvas PBL and a set of cards intended to guide the planning of teaching in the PBL approach.

KEYWORDS

Educational Planning, Problem-Based Learning, Canvas, Computing.

1 INTRODUCTION

The PBL Planner Toolkit or (PBL Toolkit, in short), is a tool to support teaching planning with the PBL approach in Computing courses. It is composed by a canvas (table) divided into fields and a set of cards that guide the completion of the canvas and of planning. The tool is intended to be used by all educators who wish to carry out teaching planning in PBL Computing courses. Especially novice professor who have low experience in conducting educational planning, professor with low level of knowledge in the PBL approach or both. Each component of this tool is presented in section 3. A digital version of PBL Toolkit is available at http://www.pblplanner.com.

2 THE XPBL METHODOLOGY

The xPBL is a methodology that aims to align methods and tools for managing the PBL approach to education in fields such as Computer Science, in order to ensure that the principles are respected in its adoption. It was officially defined and proposed in 2014, but researches that supported its creation only started in 2006 [1]. To ensure that PBL principles that go beyond its educational objectives are met, the methodology xPBL is based on five elements: (1) Problem; (2) Environment; (3) Content; (4) The human capital and (5) Process. These elements reinforce ten principles that were established in [3].

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The elements of the xPBL methodology should be addressed at all stages of the PDCA cycle (Plan, Do, Check, Act), mainly with regards to planning being aligned to its implementation. To help the planning process and guide the definition of 5 elements of xPBL, it is also used 5W2H technique: "What?", "Who?", "Where?" "When?", "Why?", "How?" and "How Much?".

To help planning, the authors [4] proposed a guide for each element of xPBL containing 7 questions about the 5W2H technique, plus a field called Output, which is a suggestion of formalization after completion of planning of each element.

3 PBL PLANNER TOOLKIT

3.1 PBL Canvas

The PBL Canvas consists of a table divided into 11 fields. The definitions of the fields that form the PBL Canvas originated from the concepts of the xPBL metodology. Its structure was inspired on the Project Model Canvas (PM Canvas) [2]. Each field has a color and an icon to facilitate its identification. The model of the PBL Canvas is presented in Fig. 1.

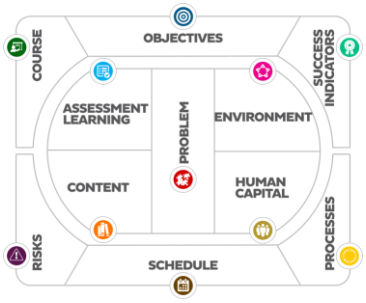

Figure 1: PBL Canvas.

For each field, a color and a different icon were assigned, in order to facilitate its distinction, as well as to ease the association with the PBL Cards. Each field represents a set of aspects to be considered in planning. These aspects are cited in section 3.3 of this poster.

3.2 PBL Cards

The 40 cards were created and distributed among the 11 fields of PBL Canvas. Each of the 40 cards has the same structure. The front of the car has basically three pieces of information from

the PBL Canvas: the name of the field; the color and icon that connects to the field. This was done to facilitate the association among cards and their respective fields in the PBL Canvas. Therefore, all cards from the same field would have the same color and the same associated icon.

Fig. 2 shows the back of the cards' structure, which contains six important pieces of information: name and icon of the related field to the Canvas; name, card identifier and a card description; the questions that guide the completion of the PBL Canvas and examples of answers to the questions. Lastly, the artifacts that can be generated when planning.

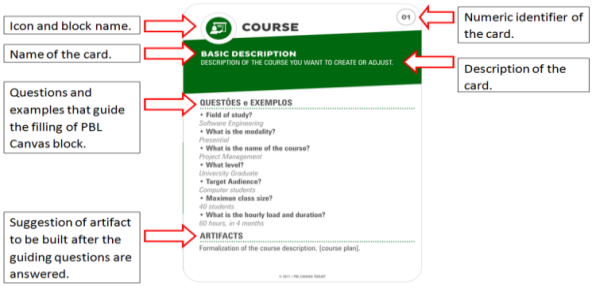

Figure 2: PBL Card Verse Example.

The question item contains queries that have been defined to promote reflection in aspects that are necessary for the planning. In formulating questions the technique used was the 5W2H. However, the queries that compose the cards are not restricted to those that are part of the technique, allowing queries that contribute best to the aspect to be planned. On the other hand, the examples item represents possible responses to each one of the questions made in the referred item. The purpose is to illustrate, for those who carry out the planning, what kind of response is expected for each question. The artifact item refers to the field Output from the proposed guide in article [1], which defines the xPBL methodology. As well as in the guide, this item represents a suggestion of a planned aspect formalization or support tool during its implementation.

3.3 How to use the PBL Planner Toolkit

Course planning with the PBL approach using the toolkit is divided into 3 phases: Planning, Revising, and Sharing, described below.

1) Planning: Planning is subdivided into 3 stages that must be performed at least once. To carry out this stage it is important that there is participation of the people who will act as teachers, tutors and coordinator. Each of these steps is described below.

The stage 1 in completing the PBL Canvas is the introduction to planning. It is composed of the fields Course, Objectives and Indicators of Success, in this order. These fields define the context of the course to be planned as well as the objectives and goals to be achieved. Planning participants should answer questions from card 1 through 9 and set responses in the corresponding fields. After setting the answers to card 9, step 1 of planning is finalized.

Stage 2 corresponds to the fields that come from the xPBL methodology: Problem, Environment, Human Capital, Content and Learning Assessment. These are the central elements of planning and are more closely related to the PBL method. It is from the planning of these fields that the methods and tools for managing the PBL approach in Computer teaching will be aligned. The process of filling in is identical to the one in step 1 starting on card number 10 through 33.

Finally, stage 3 completes the planning with the Process, Schedule and Risks fields. These fields together are responsible for defining the learning process based on problem solving to be followed, class schedules, scheduling of assessments and deliveries, as well as identifying possible risks that threaten the success of the course as a whole. The cards to fill this field range from number 34 to 40 and after card number 40, have been answered the completion of PBL Canvas will be completed.

2) Revising: The purpose of the review phase is to check issues that have raised questions during planning as well as some aspect that has not been fully answered. It is also important to make sure that the dependencies between the fields are properly aligned. For example the objective fields with those of evaluations in which the first defines the objective and in the second how to measure if it has been reached.

3) Sharing: The final phase aims to build an action plan that should list all tasks and artifacts planned during the planning phase. The action plan should contain, in addition to the task list and artifacts, the deadline for creation, the status of the task or artifact, and who is the owner. With the creation of the action plan, a version of the teaching plan is generated (baseline), which can undergo adaptations and improvements throughout its implementation.

4 CONCLUSIONS

The proposal for the creation of a specific canvas for the PBL approach using xPBL as the core methodology was to unite the positive characteristics provided by the Canvas technique such as collaboration, holistic vision, communication, and to safely preserve PBL principles through a PBL methodology focused on Computer Science. The diversity of aspects to be considered in teaching planning with PBL reinforces the need of support tools in this task so that the planning is carried out in the best possible way.

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