Opening the Door to Philosophy for Teachers with GYM-Author

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Abstract. Can a system have the ability to dynamically generate, on demand, a large number of self-learning and self-assessment exercises in order to supplement a learning environment in philosophy? We addressed this issue with our Phi-GYM project with its integrated authoring tool for tutoring systems in philosophy. Our motivation in designing the authoring tool was to: (1) Find an effective way to semi-automatically generate a wide range of exercises, and; (2) Provide philosophy teachers with an easy, autonomous, and collective way to create exercises related to classical philosophical texts without worrying about any technology.

Author Keywords: Authoring system; Tutoring system; Exercise generation; Philosophy; Text reading and comprehension.

1   Introduction

One goal of massive online education is to provide learning for thousands of students. Rapid and easy design of material that respects proven educational paradigms in a given field is thus essential to ensure the quality of such courses. The Quebec government thus undertook to fund technologies that facilitate the easy production of open, online, self-learning and self-assessment material. Thus was born the metaphor that inspired the *Philosophical Gymnasium*[1] (Phi-GYM), which aims to allow practice the intellectual gymnastics needed by Quebec college[2] students, who all have to read and write philosophical texts. The first issue we addressed and which led to the development of an authoring tool was: How can a system have the ability to dynamically generate, on demand, a multitude of pedagogically relevant self-learning and self-assessment exercises in order to supplement philosophy's planned learning environment? Our motivations in designing the authoring system were: (1) To find an effective way to continuously update the learning environment in order to provide a wide range of exercises; (2) To provide philosophy teachers with an easy, autonomous, and collective way to pen exercises, allowing them to focus on the exercise's philosophical content and not worry about technology.

There is currently no such an authoring system. The project's originality also resides in the fact that both the learning (GYM-Tutor) and authoring (GYM-Author) environment are designed as an integrated one and developed in parallel. After a review of related work, we focus on the architecture of the GYM-Author with an emphasis on its semi-automatic generation function and then explain how the two systems are integrated.

2   Related Work

The beginning of the 2000s saw AIED[i] and ITS research communities interested in authoring systems, and their classification [1-5], as they addressed the problem of the generation of learning material. Authoring systems do not support the learning itself; their purpose is to support the creation and generation of learning materials for the ITS environment, and, often provide means to generate this learning semi-automatically and even automatically. As highlighted by [6], "semi-automatic generators of exercises combine the advantages of [the automatic and manual] classes of generators", which is why we chose to design GYM-Author as semi-automatic exercise generator. We believe these to be the most adaptive, and they fit one of our primary goals to help teachers in a more efficient way.

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[1]   Known in French as "*Le Gymnase Philosophique*".
[2]   The « College » level in Quebec stands between the high school (grades 7-12) and university levels.

3   Design and Architecture Overview

GYM-Author is a web based pedagogy-oriented authoring tool in philosophy, a domain where much of the learning is made through the reading of classical texts, often written hundreds and even thousands years ago, and by producing written texts about these classical texts (either about the texts themselves or about their content).

GYM-Author provides many roles to teachers; the *learning designer role* and the *knowledge expert role* (Fig.1). The learning designer is responsible for the edition of various pedagogical scenarios according to the objectives and the contexts of learning. The knowledge expert is responsible for creating contents and exercises in philosophy following a predefined pedagogical scenario constrained by the types of questions offered: Multiple choice questions, Tagging, Cloze test and brief answer. The knowledge expert can edit the domain knowledge in order to categorize the didactic material. For instance, the philosophical notions can be organized according to the author of the philosophical text, the period of text, etc. GYM-Author, provides a predefined scenario, which is a structure of learning modules, activities, and exercises based on underlying reading and writing strategies. This scenario is only editable by the learning designer while it is implicit for the knowledge expert. Thus, Gym-author lets the knowledge expert deal with cognitive aspects (organization of domain knowledge), leaving the pedagogical aspects (organization of learning objectives and contexts) to the learning designer.

GYM-Author's architecture owns the main tools (exercise generation, scenario authoring, collective edition and preview) that support the authoring process, the domain model and the pedagogical model (Fig. 1). GYM-Author and GYM-Tutor's architectures share some components (Fig. 2). Both share: (1) the same Domain Model populated by philosophical texts, quotes, notions and related contents; (2) the same Pedagogical Model (pedagogical scenario, hints…) but they use different parts of it when needed. While GYM-Author owns an Author Model (profile, scenario building rights, collaboration rights…), GYM-Tutor has a Learner Model (profile, progression, performance, philosophical text annotated…). The core of GYM-Author is an Exercise generator tool and Pedagogical scenario-authoring tool. The core of GYM-Tutor is to be done; it's the inference engine that proceeds to the cognitive diagnostic task based on the Learner Model.
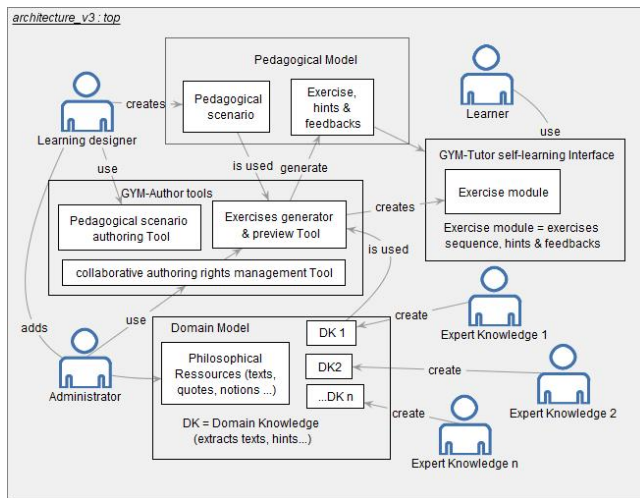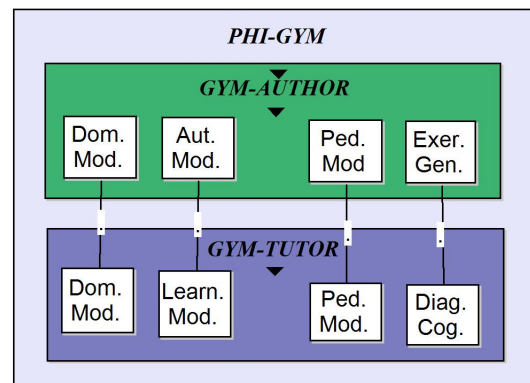

Fig. 1. GYM-Author architecture

Fig. 2. Phi-GYM system

4   Usability Evaluation

To improve and validate the design of the Phi-GYM system during its production, we have adopted a participatory design approach, based on short iterative cycles of design and development with evaluations. The expert in ergonomics intervened for evaluation by inspection then we conducted scenario-based qualitative tests with eight potential end-users. The data analysis has shown that several aspects which seem obvious to us were not for users on their first try ("I don't know where to go", "I can't find any instruction that help me", "This text doesn't seem important to me so I skip it") but the system appears to be well-mastered, memorized and pleasant after a full exploration ("It's fun to do this kind of exercises", "Finally I find this tool convenient"). The user

quickly becomes effective with the system and manages to generate perfectly usable exercises. These results are already considered in the next iteration and further tests are planned including with GymTutor.

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