

How can Psychology inform the Design of Learning Experiences?

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Abstract—Psycho-pedagogical theories have a high impact on learning. Our aim is to analyze results of behavioral and cognitive psychology to help designers of learning experiences with specification of requirements. We have reviewed literature on human decision making processes, organized a survey and a workshop with PhD students to collect various opinions on these issues, and here we summarize the outcomes.

Keywords: Psychology, Design of Learning Experiences.

I. INTRODUCTION

The results of behavioral and cognitive psychology [1, 2, 3] show that humans err predictably and this knowledge can be harnessed to support them. Various biases emerge from the interplay between the different systems driving our thinking processes. Choice architecture can influence options in a way that will support choosers to act in their own interest, preserving freedom of choice [3]. Here we present the outcomes of our study and summarize their consequences for design of learning experiences.

II. OUR STUDY

We have attempted to investigate the influence of the above mentioned findings from psychology on the design of learning experiences. To achieve this we have organized a workshop with PhD students, who were dealing with technology enhanced learning (TEL). Some of them were more pedagogically and others more technically oriented, but they all had an academic interest and good understanding of learning experience, both theoretically and practically. Before the workshop we initiated a survey to test the impact of choice architecture on the responses of people in practice and to find out opinions on some TEL issues.

A. Survey

Our survey on present learning contained 10 statements on 4 issues (provided in a mixed order). 31 participants, mostly PhD students, responded to the statements using a five point Likert Scale. The outcomes indicated that our respondents mostly think that too much freedom for the learner may be overwhelming and contra productive. Similarly, they agree that learners require pedagogical assistance. Also the opinion that both content and form of the learning experience are equally important is shared by a high majority. Finally, almost all of them appreciate availability of a competent tutor. In addition to these findings we can

easily see how important it is to find a right formulation of a statement in order to achieve a common consensus. Slight changes in wording may dramatically change responses. At the same time this demonstrates that to identify real opinions and preferences of people may be a tricky issue and choice architecture can influence them essentially.

B. Workshop

The workshop took place in June 2010 at an international event. We had 5 groups, each consisting of 5-6 PhD students in the TEL area. The total duration was almost 2 hours. As an introduction to the workshop we presented the findings from psychology, the results of our survey, and principles of choice architecture [3]:

- *Default options:* a lot of people end up with it
- *Expect error:* a well designed system is forgiving
- *Give feedback:* to improve the performance
- *Understand mappings:* from choice to welfare
- *Structure complex choices:* elimination by aspects and collaborative filtering
- *Incentives:* put the right incentives on the people

To relate it to our project ROLE (www.role-project.eu), we explained its approach to the design of learning experiences [4]. It is based on a psycho-pedagogical integration model (PPIM) to support personalized self-regulated learning (SRL) [5]. The principles of the model:

- *Guidance and freedom:* depending on the learner's SRL skills
- *Motivation:* SRL should lead to intrinsic motivation
- *Meta-cognition:* stimulated by selecting resources and getting feedback
- *Collaboration:* good practice sharing among peers
- *Personalization:* recommendations based on the learner's profile

Then we asked the participants what is the impact of the findings from behavioral and cognitive psychology on design of learning. In the collaborative sessions participants in groups first discussed the question for 30-45 minutes. The relatively abstract question was typically investigated in a more concrete context chosen according to the interests of the members. Afterwards each group presented its outcomes and finally a brief summary concluded the workshop. An overview of the outcomes is summarized in the Tab. 1. We can see that an investigation of a mapping between two different perspectives in a specific context can lead to

various results and focusing on one dimension a group can sometimes forget about the other.

TABLE I. SUMMARY OF THE WORKSHOP

Group	Topic	Psycho-pedagogical Aspects	Choice Architecture
1	Language Learning / PLE	Collaboration Personalization	Defaults Feedback Incentives
2	Language Learning / Comics	Motivation Collaboration Personalization	Defaults Feedback
3	Language Learning / PLE	Guidance Motivation Meta-cognition Collaboration Personalization	
4	Virtual Summer School	Motivation Collaboration	Defaults Expect error Feedback Mappings Structure choices Incentives
5	Theory / Practice	Guidance Motivation Meta-cognition Collaboration Personalization	Defaults Expect error Feedback Mappings Structure choices

III. DESIGN OF LEARNING EXPERIENCE

In this section we summarize the impact of the above mentioned findings on the design of learning experiences, considering the main principles of SRL and PPIM.

A. Guidance and Freedom

The degree of guidance and freedom should be adapted to the learner's needs and abilities. As too much freedom may become overwhelming and contra productive, suitable pedagogical assistance and recommendations can help a lot. Because of human fallacies the choice of the learner can be influenced by default options, understanding of mappings from choice to welfare, and structure of complex choices.

B. Motivation

For the learning progress and learner's satisfaction motivation plays a key role, both intrinsic and extrinsic. An ideal context provides an environment as authentic as possible. Appropriate interaction and interventions are needed to keep the learner's motivation and attention at a high level. From the psychological point of view the right incentives and a prompt feedback are required.

C. Metacognition

Meta-cognition should be stimulated by engaging learners with the key processes of SRL – goal setting, planning, and reflection. Reasonable goals and realistic plans are the cornerstone of the whole process. Then learner has to be aware of the *progress* of the learning process, therefore suitable notification mechanisms need to be used that will be informative, but not distracting. Implicit and explicit assessment helps to show the progress, in the later case providing neutral and comprehensible choices. The learner

must receive a clear feedback on the learning progress to be able to distinguish success from failure.

D. Collaboration

Recommendations can come either from experts or from the crowd. An advice from a competent tutor (knowing the subject, pedagogy, and the learner) can be very valuable, but is not always available. The knowledge of experts can be also encoded in a learning system, but its formalization and orchestration is still a big challenge. On the other hand, excellent results can be obtained via social recommendation, especially if they are based on experience of similar people in a similar context [1].

E. Personalization and Adaptability

SRL prefers recommendations to automatic adaptation. Personalization is based on the learner's knowledge, experience, and preferences. Adaptation deals mainly with the context taking into account the current constraints, available resources, as well as the emotional aspect. Also instructional design has to consider alternative approaches, methods, perspectives, activities, metaphors, and stories to provide flexibility and different points of view, but without misleading and oversimplification. Default options and understanding mappings from choice to welfare are crucial.

IV. CONCLUSION

We aimed to investigate an impact of the results from psychology on design of learning experiences. Literature suggests that cognitive biases may be overcome by suitable choice architecture, which should preserve freedom of choice by providing suitable recommendations that are easy to avoid. Our main objective was to apply these findings in design of learning experience and to identify their corresponding functional and non-functional requirements, especially when SRL is considered. We share the opinion that decision making is essential for the quality of the learning outcome and should be supported carefully to optimize the learning experience for benefit of the learner.

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