

Chapter 33

Modeling the Player: Predictability of the Models of Bartle and Kolb Based on NEO–FFI (Big5) and the Implications for Game Based Learning

Johannes Konert

Technische Universität Darmstadt, Germany

Stefan Göbel

Technische Universität Darmstadt, Germany

Michael Gutjahr

Technische Universität Darmstadt, Germany

Ralf Steinmetz

Technische Universität Darmstadt, Germany

ABSTRACT

For adaptation and personalization of game play sophisticated player models and learner models are used in game-based learning environments. Thus, the game flow can be optimized to increase efficiency and effectiveness of gaming and learning in parallel. In the field of gaming still the Bartle model is commonly used due to its simplicity and good mapping to game scenarios, for learning the Learning Style Inventory from Kolb or Index of Learning Styles by Felder and Silverman are well known. For personality traits the NEO-FFI (Big5) model is widely accepted. When designing games, it is always a challenge to assess one player's profile characteristics properly in all three models (player/learner/personality). To reduce the effort and amount of dimensions and questionnaires a player might have to fill out, we proved the hypothesis that both, Learning Style Inventory and Bartle Player Types could be predicted by knowing the personality traits based on NEO-FFI. Thus we investigated the statistical correlations among the models by collecting answers to the questionnaires of Bartle Test, Kolb LSI 3.1 and BFI-K (short version of NEO-FFI). A study was conducted in spring 2012 with six school classes of grade 9 (12-14 year old students) in two different secondary schools in Germany. 74 students participated in the study which was offered optionally after the use of a game-based learning tool for peer learning. We present the results statistics and correlations among the models as well as the interdependencies with the student's level of proficiency and their social connectedness. In conclusion, the evaluation (correlation and regression analyses) proved the independency of the models and the validity of the dimensions. Still, especially for all of the playing style preferences of Bartle's model significant correlations with some of the analyzed other questionnaire items could be found. As no predictions of learning style preferences is

DOI: 10.4018/978-1-4666-8200-9.ch033

possible on the basis of this studies data, the final recommendation for the development of game-based learning application concludes that separate modeling for the adaptation game flow (playing) and learn flow (learning) is still necessary.

INTRODUCTION AND MOTIVATION

During the design phase of a computer game decisions have to be made, how the preferences of the user, his playing behavior, gained abilities and his personal characteristics are measured and represented in a model. Usually different types of measures are kept and updated in separate models for style of game play behavior (player model), skills and abilities achieved and proofed during game play (learner model) and more static characteristics of the player's personality (personality model).

To keep a player immersed into the computer game a continuing measurement and update of the model dimensions is necessary to refine the knowledge about players' preferences and his changing (growing) set of game-related skills. Thus, the adaptation can choose suitable alternatives of game content and/or learning content and balances the difficulty of challenges with the players' abilities, well known as maintenance of a flow status (Chen, 2007).

Even though several theories and related, empirically validated, models exist to categorize player behavior into playing style preferences and learning behavior into learning styles, they all have a natural common aspect: they focus on decisions and behavior *of the person to model*. Concerning such modeling of a person, very sophisticated models exist in psychology that have been refined and empirically proved across manifold cultures and generations. The NEO-FFI (also known as Big-5 model) is a widely accepted model representing a person's personality in five dimensions. Thus, we

investigated how well playing style preferences and learning style characteristics of a person can be predicted by measuring mainly the personality traits. In general, *traits* refer in the following to independent dimensions, for which a person's peculiarities are measured and represented on a scale, resulting in a unique profile as a combination of these dimensions. On the contrary, *styles* and *types* are rather a set of alternatives to assign the most suitable to a specific person. Still, styles and types most often allow assignment of one or several alternatives using a scale to express how much they apply.

As the NEO-FFI is widely accepted as one of the most precisely models for personality traits, it might be possible to establish a standard on how player models are to be build, measured and how game adaptation may use such models then. Likewise the learning styles could be predicted based on the personality characteristics of a person.

To find the dependencies and correlations among the models to predict player type and learning styles from personality traits of a person, we describe in the following sections the used models in more detail, how we setup the study and discuss the results.

We use the NEO-FFI model as an accepted model representing a person's personality. This work is focusing on the possibility to predict (game relevant) preferences of a person by knowing the person's personality values. It is not intended to deepen the discussion about what personality is. Hence, a common personality model (Big-5) is used, even though there may be other suitable concepts of what personality is.

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