

Big Five Personality in Online Learning and Games: Analysis of Student Activity

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ABSTRACT

Online learning gives promise of effective learning for masses. Personalized learning experiences tailored for individual needs and preferences of each student are key ingredients in making online learning successful. Current approaches to adaptive and personalized online learning use student's personality profile and preferred learning style to adapt learning content and activities in order to provide the best possible experience to each individual student. Research has shown that effects on different types of learning activities in various settings may be different. This study analyses how personality affects student's performance in an online learning environment for programming exercises and how the student's personality can be estimated unobtrusively using a casual online game. The data used to evaluate were collected from an online learning environment used in university programming courses over the course of several years. The activity indicators show significant correlations with overall academic results of students and particularly with personality traits.

KEYWORDS

Big Five, Learning Performance, Online Game, Online Learning, Personality Model, Predicting Activity, Programming Course, Student Personality, University

INTRODUCTION

The popularity of online learning and massive open online courses (MOOCs) specifically, has enabled a scalable way for almost anyone to participate in learning. Given the huge number of users and their individual differences, online learning systems can suffer significantly from a one-size-fits-all approach. The way how a learning system is designed may enable a good studying experience for a certain type of students, but may inhibit learning of others. Therefore, methods to make the learning experience effective for everyone are being extensively developed. Student's personality traits and learning characteristics may affect various learning activities differently, and e-learning systems must be designed specifically to account for different student's learning characteristics (Kim, Lee, & Ryu, 2013).

The first part of this paper analyses student's personality in the context of student activity in an online learning system for programming exercises (Návrát & Tvarožek, 2014) used in university programming courses. Several indicators of activity were defined in the system expressing students'

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characteristics such as willingness to study, cleverness and determination. Relationships between the activities and personality traits were examined in order to better understand for which users is the system most suitable and what could be improved to engage users of the other personality types. The results show that less extroverted students tend to work on more tasks (programming exercises) in the system. Machine learning can also be used to predict activity of a student with decent success rate regarding total number of tasks and unsolved tasks.

Ideally, online courses will be designed to contain activities suitable for each personality characteristic to learn effectively, and appropriate teaching strategies will be selected based on the student’s personality profile. Reliable identification of student’s personality profile and characteristics is therefore an important step in enabling a truly personalized learning experience. Using self-report psychometric instruments, such as NEO-FFI, intrinsically includes personal biases (Castillo, Gama, & Breda, 2004) and automatic methods for identifying personality based on observed activity are being developed, recent developments include Ghorbani (2015) who proposes a method to identify student’s personality in an e-learning system based on their networking behavior.

Games as an entertaining component are used not only for improving student’s learning performance (Hwang et al. 2012), but also as an alternative fun way for data collection. The second part of this paper therefore further explores how a casual online game can be used to identify student’s personality profile. On a data collected from an online learning system where students could play the game which included various standard casual game features, the study examines how the game features and personality traits affect student (player) engagement and gameplay.

RELATED WORK

Research in behavioral psychology is interested in how to measure person’s personality. One of the most popular models used by psychologists is Big Five personality taxonomy describing five personality traits – openness, conscientiousness, extroversion, agreeableness, neuroticism (McCrae & John, 1992). Description of the particular dimensions of the model is in Table 1. Self-report questionnaires are used to measure the personality characteristics. The most popular one is NEO-FFI consisting of 60 items, 12 per each trait, rated on 5-point scale. It is a relatively quick way to measure person’s personality profile, takes approximately 10 minutes to fill out, and has been shown to have good internal and external validity (Costa & McCrae, 1992). The NEO-FFI self-report questionnaire is often used in academic research when studying the influence of personality.

In educational setting, additional models which describe learning characteristics of students are commonly used. One of the most popular is Felder-Silverman learning style model (Felder, 1993) which was developed in order to describe how students receive and process information. The model consists of four dimensions, described in Table 2.

Educational psychology research has examined how personality affects the learning process. Several research works (Busato et al., 1998; Busato et al., 1999; Farsides & Woodfield, 2002;

Table 1. Overview of big five dimensions (McCrae & John, 1992)

Dimension	Properties of people with high score
Openness	Interest in searching new things and inexperienced stimuli, unconventional
Conscientiousness	Self-discipline, prudence, following rules, strong will, active planning, organizing and completing tasks
Extroversion	Socializing, cheerfulness, searching new options and experiences
Agreeableness	Obedience, cooperation, friendliness, helping others
Neuroticism	Emotional instability, shyness, sadness, embarrassment

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