Predicting and understanding student attitudes and behaviour in e-learning

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Abstract

This paper will review personality theory with respect to technology use with a special emphasis on education and educational technology. The paper summarises some of the major personality and learning theories and details much of the research which has been conducted in this area. Major emphasis is placed on work which has adopted the Myers-Briggs Type Inventory (MBTI) and the latter part of the paper concentrates on describing research which has used the MBTI in computer based education. The paper concludes with a summary and suggestions for future work using personality theory in educational technology.
Keywords: personality, student attitudes, e-learning

1 Introduction

The idea of looking at personality as a factor in human computer interaction is not new. Van Muylwijk et al. [48] was among the first to recognise that personality traits would have a major impact on both behavior and attitudes when using technology. This idea of looking at personality and interaction styles was followed up by both Van der Veer et al. [46] and Singleton [44]. Van der Veer proposed a more general approach where various personality factors would have some affect on attitudes towards and use of the system. In contrast Singleton proposed intelligence as a single factor which he believed would predict the degree of success in using computer systems and in having positive attitudes towards computer systems. Later investigations into the role of personality included a series of experimental studies by Van Hoe et al. [47] who attempted to look at the role of personality and preferences for menu characteristics and Weil et al. [49] who tried to find links to computer phobia. Neither Van-Hoe or Weil were successful in their attempts to find links between


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personality styles and computer use or attitudes. This may have been because they were simply looking at more high level personality factors or that the tasks they selected were so far removed from day to day experience that classical personality theory was overwhelmed by system characteristics. By the early 1990's computer systems had advanced enough to allow for computer mediated communication which permitted more naturalistic communication styles. It is not therefore surprising that when Adrianson and Hjelmquist [1] investigated the role of extroversion in computer mediated communication he found significant differences connected with the extroversion factor but that these were much weaker than in normal face to face communication. We must again recognise that in the early 1990's although CMC provided naturalistic communication it did not support video or audio conferencing except in rare research settings.

2 Personality factors in educational technology

Much of the potential for successful use of personality factors within technology lies within the area of educational information technology. For example, Arnone et al. [2] proposed that curiosity would be the major factor in deciding how effective a student would find a computer based teaching environment. More recently others [5,35] have proposed that it would be the teachers personality factors that would be most influential in the success of pedagogical information systems. While there appears to be little doubt among researchers that personality factors are of great importance in determining the successful use of information technology in educational settings [7, 24, 5, 22, 43] comparatively little work has actually been reported in the general personality literature. Those studies which have been reported either have looked at abnormal and pathological computer users [16] who are hopefully not representative of a general student body or have reported finding no differences in personality between predicted groups of users [9]. Those studies that have reported finding differences have usually concentrated on the most negative areas of information technology use, such as gender imbalance [23], the role of personality in repetitive strain injury [34] or the personality factors involved in computer based stress [32,25].

2.1 Current personality measures

Throughout the study of the mind various types of personality have been proposed, ranging from the "humours" proposed by the early Greek philosophers to the personality factors investigated by psychologists in the 20th century [28, 13, 14]. Although different personality theorists have used different terms to describe the important (non-cognitive) dimensions of personality, more recent research has isolated 5 broad dimensions of personality, which are often called "The Big Five". One frequently cited organisation of these Big Five is Goldberg's FFI [18, 19, 20] where the Big Five are associated with the following types: Extraversion, Agreeableness, Conscientiousness, Emotional Stability and Openness. In contrast to these formal descriptive types the less discriminatory measures derived from Jung's [30] personality theory are called the Myers-


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Briggs Type Inventory (MBTI). Within the MBTI 'The Big Five' are associated with the following types: Extraversion vs. Introversion, Feeling vs. Thinking, Judging vs. Perception and Intuition vs. Sensing.

2.2 The Myers-Briggs personality type inventory (MBTI) in education.

The history of the use of the Myers-Briggs Type Inventory within education is relatively long. As early as the late 1960's Richek [42] had proposed that the MBTI might be a suitable instrument to determine the best teachers with regard to teaching style and material presentation to students. Although the history of the MBTI within education is long it took some considerable time for it to gain widespread support. Early evaluations compared the MBTI and other personality measures such as Cattell's 16PF [6] in the role of predicting successful learning styles and grade point averages [12] and although researchers such as Lorr [36] had problems recognising the usefulness of the MBTI on the whole by the early 1990's there was growing support and recognition for both the validity and reliability of the MBTI in education [40,4]. Since that time although there have been some studies which raised concerns that the MBTI was being taken out of context from Jungian theory [17] and that it might not truly reflect unconscious desires [3] it has been found to be one of the best predictors for many aspects of education and educational technology [12, 26].

2.3 Learning styles

As early as the mid 1970's researchers in education were investigating the possible links between Carl Jung's typology of conscious functioning [30] and general learning styles amongst students. Early results from studies such as Millott and Cranney [39] found significant links between the MBTI types INP (Introversion, iNtuition, Perception) and learning style differences in reading comprehension. Later work by Lyons [37] proposed that teaching styles matched the teacher's own learning style and factors identified by the teachers MBTI scores. Following Lyons proposal Provost and Anchors [41] reported the importance for the teacher to match their teaching style to the preferences of the students learning styles as determined by the MBTI. Indeed, work by Jensen [27] showed that there was a strong link between the students MBTI type and their preferred and most effective learning style. However, it took nearly another decade before researchers could define specific MBTI types to students preferred learning styles. One of the first researchers to investigate this area was Drummond [11] who proposed that there were strong links and overlaps between the MBTI type of a student and their preferred Gregoric Style Delineator (GSD) [11]. By the mid 1990's researchers had begun to specify the actual learning styles preferred by specific MBTI types such as Harasym et al.'s [21] work with the GSD such that MBTI type SJ (Sensing, Judging) had a marked preference for GSD learning styles of a concrete sequential nature. In contrast MBTI types NP (iNtuition, Perception) preferred concrete random GSD learning styles and MBTI type T (Thinking) showed a marked preference for GSD learning style of abstract sequential. Finally MBTI types F (Feeling) preferred GSD learning styles of an abstract random nature. In terms of MBTI types and group

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interactions the work of Johnson [29] showed that MBTI type T's (Thinking) liked learning environments with competition to other students, MBTI types F preferred learning groups which focused on accommodation, MBTI types E (Extraversion) preferred group working where individuals collaborated and finally MBTI types I preferred group activities where conflicts were avoided. These findings are of major importance when we take students and force them to use computer supported collaborative environments. It is therefore vital to gain further understanding of the consequences in terms of student satisfaction performance and effectiveness of putting students with different MBTI types into one common environment.

2.4 MBTI in subject study prediction

Most modern research with the MBTI has not focused on trying to identify the MBTI type of the highest scoring students, since we have already recognised that this may simply be a result of the learning style imposed in that particular educational environment. It is known that the students communication when working in groups is strongly predicted by MBTI scores [31] and this may have a direct link to findings that have shown that students in non typical learning situations, for example, TV presentation of lectures or other distance learning settings do best if they have an MBTI type N profile [10]. Indeed it has been known since the late 1980's [33] that non standard teaching environments such as distance learning settings or computer based teaching (CBT) give preference to different MBTI types and different learning styles than traditional learning settings. For example, early experiments reported finding that students with MBTI type S performed better on computer based teaching systems than N types [33]. However, we must realise that these early CBT systems did not involve a distance component and that these findings may well have changed as the nature of computer based teaching and learning environments have changed (modern computer based teaching systems place an emphasis on collaboration). The overall activity and types of interactions undertaken by a group are known to be under the influence of MBTI types such that the overall combined MBTI types of the individuals in a group accurately describe and predict that groups behaviour [45]. This means that it is possible for an educator to accurately gauge the overall MBTI types of a particular cohort of students before formal educational practices begin. The potential for allowing modification of teaching style or learning environment to match individual MBTI types or even group MBTI types is enormous. For example, when controlled studies are performed where professors deliberately teach in the manner matching their student MBTI scores, student satisfaction ratings and overall grade performance are significantly enhanced [41, 8, 38, 15].

3 Summary and conclusions

In this paper we have summarised some of the important research in the area of personality and the use of technology with a particular emphasis on the role of personality in education and especially with regards to educational technology.

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In our own research which builds upon this literature we have investigated the possible link between MBTI types and the attitudes and behaviour of students using computer supported collaborative learning environments. We have found statistically significant differences between the major personality factors in terms of the use of the learning environment and attitudes towards the various components of the online collaborative learning system. Based on our findings we strongly support the idea that the MBTI can provide a useful tool in configuring such online learning environments to student's personalities and preferred learning styles. Of the MBTI types investigated in our own work the dimensions of Extrovert/Introvert and Sensor/Intuitive appear to be most promising as major predicting factors in learning styles and system component preferences. These can be summarised such that Extrovert-Introvert dimension determines the primary learning and interacting style, while the Sensing-Intuitive dimension predicts the use or avoidance of certain system components. The remaining dimensions Thinkers / Feelers and Judgers / Perceivers appear more related to attitudes toward group work and may reflect some previous experience within our subject population. It is to be hoped that future research will investigate methods in which MBTI type tests for Extrovert / Introvert and Sensor/ Intuitive can be directly linked to real time online changes within the collaborative learning environment to more closely match students preferred interaction styles and preferred learning tools.

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