



The impact of identity on anxiety during wiki editing in Higher Education

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Title: THE IMPACT OF IDENTITY ON ANXIETY DURING WIKI EDITING IN HIGHER EDUCATION

Abstract

Purpose: Although wikis are common in Higher Education, little is known about the wiki user experience in these contexts and how system characteristics impact such experiences. This research explores experimentally the hypothesis that changing the anonymity of identity when editing wikis will impact significantly on user editing anxiety and that this may be dependent on the type of edit being conducted.

Design/Methodology/Approach: This hypothesis was explored using a controlled experiment study whereby users were given excerpts to include in their own words on a wiki site used for a psychology course. Users edited the wiki anonymously, using a pseudonym relevant to the context (a matriculation number) and using a full named identity. Users were also either asked to add content to the wiki or to delete and replace content on the wiki site.

Findings: We found that users experienced significantly less anxiety when editing anonymously compared to when editing with a pseudonym or full name and that the type of edit being conducted did not impact the anxiety felt.

Originality/Value: The research highlights that the effects of anonymity discussed are also in operation in a wiki context, a more fundamentally anonymous context compared to blogs, bulletin boards or general computer mediated communication tools.

Introduction

IT now forms a crucial part of the Higher Education (HE) experience. Web 2.0 tools such as wikis have become important elements of the student IT mix. Although wikis are becoming more popular in HE there is a lack of knowledge about student's user experience and how wiki site characteristics affect this experience. In HE students edit wikis infrequently (Kickmeier-Rust et al. 2006) and negative emotions towards wiki editing are thought to impact on this (Cole 2009). Striving to understand what impacts the wiki user experience is therefore of high importance as anxiety during editing may lead users to edit infrequently or not at all, significantly impacting the effectiveness of wikis as inclusive and collaborative HE tools. What's more in situations where wiki editing is a compulsory part of coursework users may edit in distress affecting students' HE experience. The research presented aims to offer insight in how the identity used when editing impacts upon users' anxiety during wiki contribution in HE.

Background to the research

A wiki is an editable website where users can view, add and alter the structure of site content. This flexibility facilitates collaborative knowledge building and allows for mistakes or falsehoods within wiki content to be amended easily (Wang & Turner 2004). Wikis have grown in popularity as pedagogical tools in HE and much research attention has recently been paid to their use in educational contexts (Cole 2009; Ebner et al. 2008; Parker & Chao 2007; Wang & Turner 2004), more recently looking at anxiety in the HE wiki user experience (Cowan & Jack 2011; Cowan & Jack 2010).

Research on the pedagogical use of wikis has identified that wiki users are anxious towards the judgement of other users when contributing to wiki systems and lack confidence in the quality of their contributions (Giordano 2007; Guzdial et al. 2002; Ardichvilli et al. 2003). Editors also seem concerned over the criticism their contributions might attract from other wiki users (Da Lio et al. 2005). Our study aims to empirically assess this anxiety and how editing identity can impact on this. Specifically we hypothesise that using certain editing identities that vary in anonymity when editing the wiki could alleviate these concerns and impact user anxiety towards contribution.

Research into Computer Mediated Communication (CMC) has demonstrated that this relatively anonymous communication medium leads to less inhibition and a reduction in user self-awareness (Kiesler et al. 1984). Anonymity has also been demonstrated to lead to lower social anxiety and social desirability scores compared to when tests were named suggesting a trend towards disinhibition when anonymous (Joinson 1999). This supports the idea that “*under the protective cloak of anonymity users can express the way they truly feel and think*” (McKenna & Bargh, 2000, p.62). Being anonymous allows users the flexibility to express

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3 ideas without the fear of negative evaluation from peers and the constraints of other social
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5 forces (Christopherson 2007).
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8 However there are benefits to the user when using less anonymous identities in
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10 content sharing communities. Using a full name identity benefit the user in terms of
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12 developing reputation and social capital (Donath 1998). In virtual communities the use of
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14 users' real names has been seen to increase trust between the users and users feelings of
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16 accountability for the contributions made (Millen & Patterson 2003). Specifically in virtual
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18 communities reflecting real world social structures (such as an HE class or business team)
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20 these identities also give the information evaluator (the reader of information on content
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22 sharing communities) cues to assess the validity and accuracy of contribution as they relate to
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24 identities, assumptions of ability and relationships in the real world (Millen & Patterson
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26 2003). Yet this identification is socially costly if the community judges information as poor
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28 or irrelevant.
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32 A compromise between the benefits of anonymity and the need for identification
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34 exists in the use of unique identifiers that do not give a direct indication of the true users
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36 identity such as a pseudonym. Using a pseudonym in contribution to knowledge communities
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38 reduces the ability for content to be traced to real world identities and also allows users to
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40 gain reputation benefits for content contribution (Donath 1998). They allow an element of
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42 anonymity whilst providing the opportunity to construct an identity with which readers can
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44 then use to assess quality of contribution through previous activity. It allows for reputation to
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46 be separate from the users' real world identity therefore meaning potential judgements by
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48 other users do not affect group standing or, if the online group is a reflection of a real word
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50 group structure, real world status.
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54 The impact of identity on anxiety in a wiki context has not been studied. Wikis do not
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56 possess the same potential for direct attribution and dynamic response as many CMC or
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3 content sharing technologies. The anxiety and the benefits related to identity in CMC
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5 scenarios are likely to be different to those experienced when contributing to a wiki site. The
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7 anxiety evident in a wiki scenario may be more of a concern of creating content for and the
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9 potential judgement of an imagined audience (Brody & Park 2004; Marwick & Boyd 2011)
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11 rather than being concerned primarily with information being attributed directly to them. This
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13 is not to say that this attribution concern is not present. Wikis store information on who has
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15 contributed to the page along with details of the edits using page history functionality so it is
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17 still possible to identify who has contributed content. It is just that this is not as easy or as
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19 prominent on wiki sites as in other virtual community tools. Research has shown that wiki
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21 editors psychologically hold a sense of individual ownership of the content they are
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23 contributing (Bryant et al. 2005) which may mean editing identity could have a significant
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25 impact on the editor anxiety.
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30 Additionally, within a wiki context anonymity may also influence how users feel
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32 when conducting different types of wiki editing behaviour. Studies looking at wiki use in
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34 both business and educational context have highlighted user reluctance to edit other users'
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36 contributions (Da Lio et al. 2005; Guth 2007; Lund & Smordal 2006; Munson 2008).
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38 Students have been seen to edit their own contributions rather than editing those made by
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40 others and find it difficult to embrace the collaborative nature of wiki content creation (Guth
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42 2007), potentially explained by the feeling of individual content ownership mentioned
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44 previously. Editors may also feel concerned that they are editing others content in which
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46 retribution may be sought on their content or offence may be taken (Da Lio et al. 2005).
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48 Although users may be reluctant to edit others contributions this action is a necessary process
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50 when creating knowledge resources on wikis so that the page reflects the interpretation of the
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52 user community. Users may be less anxious about deleting content on the wiki page if they
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54 are anonymous or using a pseudonym rather than editing using their full name.
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Research Aim

The purpose of this work is to identify whether wiki editing anxiety is significantly affected by identity used when editing. It is hypothesised that there will be a significant difference between wiki anxiety experienced during editing depending on the identity conditions used. Additionally it is hypothesised that there will be a significant effect of edit type (*adding* versus *deleting & replacing* content) on wiki anxiety. Furthermore a significant interaction between the identity conditions and the type of edit is hypothesised on wiki anxiety. Users' anxiety in the different edit type scenarios will be significantly affected by the identity users are using when editing.

Method

Participants

74 undergraduate psychology students (16 Male, 58 Female) at the University of xxxxxx took part in the experiment (M= 21.51 years; S.D. = 3.18). All (74) had previous experience editing a wiki. 71 participants had previously edited a wiki at the University of xxxxxx with 3 participants having experience editing other wikis.

Questionnaires

Wiki Anxiety

The Wiki Anxiety Inventory-Editing (WAI-E) (Cowan & Jack 2010; Cowan 2011) measure contained 9 positive and 13 negatively worded items. The WAI-E items referred to aspects such as *flexibility concerns* ("I was nervous about changing existing content on the wiki"), *confidence in editing* ("I felt confident when contributing to the wiki"), *fear of judgement* ("I was afraid that people may find faults with any edits I made"), *anxiety in interaction* ("when editing the wiki I felt anxious about making a mistake").

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3 A version of the questionnaire was given before interaction (WAI-E-Pre) and after
4 each editing experience. Wiki anxiety was measured using a 5-point Likert scale ranging
5 from Strongly Disagree (1) to Strongly Agree (5). All positively worded items were reverse
6 scored so that a high score reflected high anxiety levels. To control for item order effects the
7 items of each questionnaire were randomised within the measures to create 4 order sets that
8 were randomly allocated to each experiment ID before the experiment. All were administered
9 using paper versions of the questionnaires.
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18 19 *Experiment Scenario*

20 Participants were told they were collaborating with other psychology students at the
21 University of xxxxxxxx in building an online knowledge repository for central theories in each
22 area of psychology taught at the University. Participants were told that the wiki page being
23 edited took the form of describing a psychological theory and then describing findings from a
24 relevant paper focusing on that theory. The summary of the theory was created by the
25 experimenter and posted on the wiki to seed the wiki with content before participants edited
26 the wiki to add legitimacy to the claim that other users were contributing to the site.
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40 *Experiment Design*

41 *Editing Identity Conditions*

42 All participants experienced editing the wiki using three identity conditions in a within-
43 subjects design. Each of the conditions varied in their levels of anonymity. In the *Anonymous*
44 condition no identity information was attached to their contributions in the wiki page editing
45 history. Participants were informed that the edit they made would be labelled as *Anonymous*
46 on the system.
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3 When editing in the *Matric* condition participants were given a student number
4 created by the experimenter (s0686784). They were informed that this matriculation number
5 would be recorded in the wiki page edit history with details of the edit made, as is the case
6 with all wiki sites.
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11 In the *Name* condition participants were told that they would be editing the wiki using
12 the name Sam Smith. They were told that their name would be attached to the edit they made
13 in the pages edit history.
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18 In all identity conditions they were reminded that other users could access the wiki
19 and the page edit history and that they were editing live content that other users could access
20 and see on the wiki. The order of conditions experienced was counterbalanced across the
21 experiment by creating six possible condition orders, so as to control for potential order
22 effects on wiki anxiety measured within the experiment.
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30 31 *Edit Types*

32 The experiment also varied the type of edit participants were asked to perform. Half of the
33 participants were asked to add content to the wiki (*Addition* condition) and the other to delete
34 previous users' content and replace it with content from the excerpt (*Delete and Replace*
35 condition) creating the between-subjects variable Edit Type. Participants in the *Addition*
36 condition were presented with blank sections on the page beside where they were asked to
37 include the information from relevant excerpts.
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47 In contrast for participants in the *Delete and Replace* condition the Findings sections
48 have been completed with content. They were informed that previous contributors had
49 inaccurately quoted the findings of the experiment and that they were to delete this content
50 and replace it with the correct findings from the excerpt. Within each of these edit type
51 conditions the experiment was balanced for condition order and task order.
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Editing Tasks

The information to be contributed came from three experiments published that had influenced thoughts on the model upon which the wiki page was based. Each contribution task focused on one excerpt. Importantly, participants were also asked to complete these tasks in their own words to increase personal engagement in the task and facilitate ecological validity. The tasks were randomised into three orders using Latin Squares. During each task participants edited the wiki using the rich text editor.

Recruitment and Procedure

Psychology students were recruited via email and were asked to take part in research investigating web based learning tools. They were informed that they would receive an £8 honorarium for participation and were asked to give their names, contact information and previous web 2.0 tools they had used. As the experiment aimed to test anxiety of wiki editors, only those with previous editing experience were contacted to take part in the experiment. Those who had no previous experience with wikis were informed that there were already sufficient participants and were thanked for showing an interest in the study. To further ensure only those who had edited a wiki completed the experiment participants were asked if they had edited wikis previously in a demographic questionnaire. If they stated they had not then they were informed of their ineligibility to take part and were thanked for showing an interest in the study.

Participants were randomly allocated to an experiment ID upon arrival. Participants were welcomed by the experimenter and were told that they were going to contribute information to a wiki aimed at psychology undergraduate students called PSYCHWIKI. They were reminded that they were able to stop the session at any point and were asked to give

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3 consent to taking part in the experiment through completing a consent form. The
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5 experimenter then completed the demographic questionnaire with the participant. After
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7 completing the demographic questionnaire they were informed they would be editing the
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9 wiki soon but before that they were to complete a questionnaire about their feelings towards
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11 editing the wiki (WAI-E-Pre). Whilst participants were completing these questionnaires the
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13 experimenter navigated to the relevant page on PSYCHWIKI.
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16 Participants were then asked to read the experiment scenario and were informed that
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18 during their interactions with the wiki they would be editing live content. They were told that
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20 although they were contributing for the first time other users were already using and
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22 contributing to the site. In reality participants edited their own personal version of the wiki
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24 page. This was so as to ensure that the content for each participant was the same upon
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26 starting editing and free from edits already made by other participants.
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29 Participants were then informed of the identity condition that they were using when
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31 editing and were then asked to read an excerpt of content that needed to be contributed to the
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33 wiki. Those in each edit type condition received the same excerpts although the type of edit
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35 they were asked to make was dependent on the edit type condition participants were allocated
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37 to (either Addition or Delete and Replace content). Participants were allowed to keep the
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39 excerpts for reference throughout the completion of their task to ensure that anxiety during
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41 editing was not influenced by concerns over not being able to remember the information in
42
43 the excerpt. After contributing participants were asked to complete a wiki anxiety
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45 questionnaire. This process was repeated for each of the identity conditions.
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Experiment Results

Reliability of Measures

In terms of the internal consistency of the wiki anxiety measures all showed high Cronbach alpha values (*WAI-E-Pre*; $\alpha = .93$; *WAI-E-Anonymous*; $\alpha = .95$; *WAI-E-Matric Number*; $\alpha = .95$; *WAI-E-Name*; $\alpha = .96$).

Identity Salience and Wiki Anxiety

A 4x2x6x3 mixed design ANOVA was conducted to analyse the effects of identity condition (within-subjects) and edit type (between-subjects) on wiki anxiety levels. Although condition order and task order were included in the analysis, for brevity, only the results related to our hypotheses will be described. A table of means for these variables is included in Table 1.

[Insert Table 1 about here]

There was a significant main effect of identity condition on wiki anxiety during editing [$F(3, 114) = 2.97, p = 0.035$]. LSD Post Hoc tests demonstrated that participants experienced less anxiety during editing when in the *Anonymous* ($M = 52.04$) condition compared to when editing in the *Matric* ($M = 55.50$) ($p = 0.016$) and *Name* ($M = 56.24$) conditions ($p = 0.023$). Participants' anxiety when editing in the *Matric* and *Name* conditions did not differ significantly ($p > 0.05$). The anxiety participants felt about editing the wiki before interaction (as measured by the *WAI-E-Pre* measure) ($M = 54.74$) also did not differ significantly from the anxiety experienced in any of the identity conditions ($p > 0.05$). Therefore the hypothesis that there would be a significant difference between the identity conditions on wiki anxiety during editing is supported.

A significant main effect of edit type was not found on wiki anxiety during editing [$F(1, 38) = 0.229, p > 0.05$]. Participants did not significantly differ in anxiety during editing in

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3 the addition and delete and replace conditions, thus this hypothesis was not statistically
4 supported.
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7 8 9 **Discussion**

10 In summary the research found that participants scored less on the anxiety measure when
11 editing the wiki anonymously in comparison to when they edited the wiki using a
12 matriculation number or a full name identity. This supported our hypothesis that there would
13 be a significant effect of identity conditions on wiki anxiety during editing. There was no
14 significant difference in anxiety when editing using a matriculation number or full name
15 identity. The type of edit behaviour also did not significantly affect wiki anxiety levels,
16 disconfirming our hypothesis.
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30 *Research Synthesis*

31 These findings highlights that the “*protective cloak of anonymity*” (McKenna & Bargh 2000)
32 (p.62) seems to have an impact in a wiki editing context as we found that participants
33 experienced lower anxiety when editing anonymously compared to other identity conditions
34 tested. As mentioned in the introduction, wikis although comparable to other CMC and
35 collaborative knowledge sharing systems in terms of contributing information in a social
36 space, differ in the way that information is constructed. It is not constructed through a
37 collection of monologue postings but rather in a collectively constructed unit where users’
38 contributions are not directly referenced to the contributor within the presented content
39 (Arazy et al. 2010). Even so we have demonstrated that editing anonymously in that users
40 seem to have less anxiety when contributing to the wiki when using such an identity impacts
41 anxiety. This is likely due to a potential reduction in concern over judgement by the imagined
42 audience as well as an elimination of the possibility of the edit being attributed to them in the
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3 wikis page editing history by other users. An interesting additional impact of this may also lie
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5 in the lowering of concern about the quality of what they were contributing, something that
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7 was mentioned in post interaction interviews conducted after the experiment sessions.
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10 Further work should look at how identity impacts on quality of edits.

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12 Our findings suggest that allowing anonymous editing in an HE scenario would
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14 reduce anxiety compared to editing using a pseudonym or a full name identity. Such an
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16 identity may encourage *lurkers*, who tend to want to remain anonymous, to contribute to
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18 knowledge communities (Preece et al. 2004). Yet for purposes of allocating rewards (such as
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20 grades) based on wiki contribution pseudonym or full name editing identities is necessary. A
21
22 potential solution could be to use a more anonymous pseudonym as opposed to students'
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24 university matriculation number. A matriculation number is used throughout students'
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26 interactions with the university meaning it is likely to have a high degree of connection with
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28 the users' real world identity. The leaking of information about the user by the pseudonym
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30 affects the quality of the pseudonym in preserving the privacy of real world identity (Borcea-
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32 Pfitzmann et al. 2005). *Person pseudonyms* (such as a matriculation number) are not as
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34 anonymous as other forms of pseudonyms such as a *transaction* (identity given only for a
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36 specific individual transaction) or *role pseudonym* (identity given for the undertaking of a
37
38 specified role) (Borcea-Pfitzmann et al. 2005). Participants perhaps did not feel that editing
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40 using a matriculation number gave them a significant amount of anonymity. Using a
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42 transaction pseudonym would be impractical, but a role pseudonym could lead to similar
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44 levels of anxiety in comparison to the anonymous condition.
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50 An unexpected finding was that participants did not differ in their anxiety when
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52 adding or deleting and replacing content. This is surprising as wiki editors have previous
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54 described their reluctance to edit other users content (Guth 2007; Lund & Smordal 2006).
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56 The lack of effect may be because participants were told as part of the task to delete content.
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3 The authors felt that allowing participants to choose whether to add or deleted and replace
4 content, although high in ecological validity, would leave participants uncertain about what
5 to do, meaning some adding content rather than deleting and lead to inconsistencies in the
6 number and type of deletions made, impacting the consistency of the experimental
7 conditions. This is a limitation of using experimental design in such a context. Real world
8 users may be more anxious about deleting other users content but it is difficult to
9 experimentally assess this without inducing consistency confounds in the manipulation itself.
10 The research presented here should be used as a comparison study for research replicating
11 this study under less controlled conditions.
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23 At this point it is important to make the reader aware of some limitations to the
24 research that must be kept in mind when interpreting the findings of this study. Although the
25 *Anonymity* condition accurately reflected real life anonymous editing the use of identities
26 developed by the experimenter for both the *Matric* and *Name* conditions is likely to have
27 affected the anxiety experienced. Because of the practical complications in setting multiple
28 identity editing permissions on individual pages, setting participant specific user access to
29 pages prior to experimental participation and data protection concerns the use of participants
30 real identities in this experiment was not possible. Although the use of experiment specific
31 details may have affected wiki anxiety in these conditions, this would likely underestimate
32 the true anxiety levels as all three identities would be seen as relatively anonymous. In fact
33 significant differences were found between the anonymous condition when compared to both
34 pseudonym and name conditions respectively. The findings are therefore likely to be a
35 conservative estimation of the true anxiety experienced if real user details were used, with the
36 granularity between the pseudonym and name conditions likely to be more salient. The
37 sample used in the research was also relatively homogeneous in age and holds more females
38 than males. This however reflects the characteristics of the user population for which the wiki
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3 was designed. Psychology students were used because they held previous experience using
4 wikis in an educational context as well as the author having knowledge of the research areas
5 covered in the undergraduate course. This meant a more realistic scenario could be
6 constructed.
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11 12 13 **Conclusion**

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15 In sum, this work details results on the effect of editing identity on wiki anxiety during wiki
16 editing and whether such variables are influenced by the type of edit made by users. The
17 research found that:
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- 20 • Participants have lower anxiety when editing anonymously compared to when editing
21 with a pseudonym (in this case a matriculation number) or a full name.
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24 The findings were discussed with reference to:

- 25 • The relative anonymity of wikis as a medium for content sharing
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- 28 • How the reduction in anxiety may be due to the lowering of concerns of being judged
29 by the imagined wiki audience, as well as a reduction in edit attribution.
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34 The importance of the context of use in the assessment of these findings cannot be over
35 emphasised. The user experience of wikis in HE will not be identical to large wiki sites such
36 as *Wikipedia*. The specific nuances of each in term of edit rates, relative access to real world
37 identity of the community and desire for openness are all aspects that need to be considered
38 when assessing these findings. The balance for the need for identification and the positive
39 effect on anxiety seen by anonymity provide a challenge for educators wanting to create an
40 optimum user experience. This research suggests that the “*protective cloak*” seems to be in
41 operation in a wiki editing context in HE.
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Table 1- Means for wiki anxiety during each identity condition by edit type

	Condition	N	Mean	S.D.
WAE-Pre	Addition	37	55.78	14.35
	Delete and Replace	37	53.70	15.80
	Total	74	54.74	15.03
WAE-Anon	Addition	37	52.19	17.22
	Delete and Replace	37	51.89	17.07
	Total	74	52.04	17.02
WAE-Matric	Addition	37	57.17	17.06
	Delete and Replace	37	53.84	16.86
	Total	74	55.50	16.92
WAE-Name	Addition	37	57.62	19.54
	Delete and Replace	37	54.86	19.04
	Total	74	56.24	19.21

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