

The Relationship between Learning Style and Reflection in Student Blogs

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ABSTRACT

Authentic blogging allows students to develop their own thoughts and exchange ideas with their peers without activities or assessment set by an educator (Downes, 2006). Research on learning processes in higher education has found that blogging can encourage and facilitate reflection (Hall & Davison, 2007; Xie, Ke & Sharma, 2008). Reflection is associated with higher-order learning outcomes and a deep approach to learning and as such is considered desirable in higher education (Garrison & Vaughan, 2008; Moon, 1999; Ramsden, 2003). Some students find reflection difficult (Xie et al, 2008) while others may not reflect in the absence of set tasks and assessment (Mackey, 2007). A preference for e-learning tools, such as blogs, and an aptitude for reflection may relate to a student's preferred learning style (Kolb, 1984; Kolb & Kolb, 2005; Saeed, Yang, & Sinnappan, 2009).

This exploratory study investigates the extent to which undergraduate students are engaging in authentic blogging where tasks are not assigned by a lecturer, the extent to which their writing shows evidence of reflection under these conditions and the influence, if any, of their learning style on their blogging practice. The study participants were eleven final year students on an undergraduate Multimedia and Communications course in a non-traditional university-level institution in Ireland. Six of these students kept blogs over an eighteen-month period.

An analysis of the ninety-two student blog posts and thirty-one comments in this study found that over one third were reflective, using discourse analysis based on Hatton and Smith (1995), while analysis of a questionnaire based on Kember and Leung (2000) found the student bloggers to be reflective learners. Most of the bloggers and all the most prolific bloggers showed a preference for Kolb's converging learning style.

Albeit with a small sample, this study suggests that authentic blogs are effective tools for engaging undergraduates in reflection. It suggests that, despite misgivings about the lack of structure and scaffolding, lecturers can encourage their students to engage in authentic blogging as a means of developing reflection.

INTRODUCTION

A blog is an online journal and the blogger's personal publishing space (Downes, 2004). On the web, bloggers write for a many reasons including documenting life, commentary from chatter to the profound, catharsis, thinking through writing or as a community forum (Nardi, Schiano, Gumbrecht, & Swartz, 2004). Such blogs that develop naturally as the participants express their own ideas and develop their own connections can be described as 'authentic' according to Downes (2004) and Nardi et al (2004). Downes (2006) felt that authentic blogging in education only starts when student bloggers are able to 'think out

loud', develop their personal identity and share experiences unrestrained by prescribed rules. Such authentic blogging can lead to online conversations among students, often not on course-related topics (Halic, Lee, Paulus & Spence, 2010). However, these conversations can have educational value as the use of blogs for storytelling can enhance literacy and writing skills (Huffaker, 2005). Writers such as Downes (2004) and Richardson (2004) have made enthusiastic claims for the educational benefits of blogs as tools for creativity, reflection and communication. Potter (2008) used blogs both as a medium for reflection on learning and for practical skills development in a module he was redesigning from Multimedia Design and Communication to Internet Cultures: Theory and Practice. This module formed part of an MA course in Media, Culture and Communication at the Institute of Education (IOE) in the University of London.

Reflection and the ability to write reflectively are considered valuable in higher education as they can help students move from a surface to a deep and meaningful approach to learning (Moon, 1999). According to Dewey (1933), students do not learn from experience rather they learn from reflecting on experience. Reflection can be defined as a structured process whereby students reach a new perspective by intentionally revisiting an experience, examining their actions and any associated emotions and integrating them with prior knowledge and experiences (Boud, Keogh, & Walker, 1985). By reflecting, students explore their experiences to gain a better understanding and appreciation of their learning (Boud et al., 1985). Reflection and the ability to reflect on practice are seen in higher education as valuable skills for employment (Moon, 2004, p 73). The asynchronous nature of blogging gives students time to reflect on an experience (Halic et al., 2010).

Since the early days of blogging, blogs have been integrated into teaching practice in higher education, where one of their main purposes is to facilitate reflection (Churchill, 2009; Dos & Demir, 2013; Farmer, Yue and Brooks, 2008; Halic et al., 2010; Hall & Davidson, 2007; Mackey, 2007; Xie, Ke & Sharma, 2008). In these studies, lecturers set exercises for the students to perform in their blogs, provided guidelines for reflective writing and assessed student performance. Such 'class rules' all help students to blog effectively (Dos & Demir, 2013; Farmer et al., 2008; Hall & Davidson, 2007). In their absence, undergraduate students might lack motivation to keep a blog (Hall & Davidson, 2007). Guidelines and structure are particularly helpful where blogging involves reflection, as many students find reflection difficult (Xie et al., 2008). Student writing on an undergraduate political science course became significantly more reflective when students made a weekly blog entry over the course of a semester (Xie et al., 2008). An analysis of blog comments on an information science course found many to be reflective (Hall & Davison, 2007). In a study of reflection among medical students, Fischer et al. (2011) divided the class into two groups, one of which wrote in a blog and the other a traditional essay. They found no difference between the levels of reflection in the two groups. However, Hall and Davison (2007) found that peer interaction through comments added to the value of shared blogs for reflection when compared to private journals.

A preference for blogs or other e-learning tools and a preference for reflection may relate to a student's preferred learning style (Akkoyunlu & Soylu, 2008; Kolb & Kolb, 2005; Ocepek, Bosnic, Nancovska Serbec & Rugelj, 2013; Saeed et al., 2009). There has been extensive research on the extent to which people differ in their tendency to reflect or not, which can be framed within the research on cognitive and learning styles (Kolb, 1984;

Moon, 2004). Studies have found a relationship between students' cognitive and learning styles, their technology preferences and academic results (Akkoyunlu & Soylu, 2008; Gülbahar & Alper, 2011; Thomas & McKay, 2010). In particular, Saeed, Yang, & Sinnappan (2009) found a relationship between students' learning style and their preference for blogs over other e-learning tools.

Educators frequently observe that students grasp new concepts in different ways and at varying speeds. This leads to the idea that students have different learning styles and that they may learn more readily when teaching matches their preferred learning style (Coffield, Moseley, Hall & Ecclestone, 2004). However, the superficial appeal of this belief hides many conceptual and empirical problems, leading some researchers to contest the value of learning and cognitive styles. For example, the term learning style is very broad, encompassing models derived from different disciplinary traditions (Coffield et al., 2004). Some researchers see learning styles as an individual's preferred response or strategy to a learning task, which is context-specific and changeable, whereas cognitive styles are linked to underlying information processing mechanisms, which are relatively stable and possibly innate (Peterson, Rayner, & Armstrong, 2009). One recent attempt to synthesize work from neuroscience, psychology, and education is that of Kozhevnikov, Evans and Kosslyn (2014). It highlights the complexity of styles, given that there are different style families and levels of information processing and key style constructs may still need to be mapped. They argue that all styles involving cognitive processing are cognitive styles and these are influenced by their context and thus modifiable (Kozhevnikov et al, 2014). The fact that up to now style researchers have used style terminology differently and the sheer complexity of the field makes it difficult for practitioners to decide how to make best use of styles research in education and assessment (Evans & Waring, 2012).

It is suggested that the greatest benefit of applying cognitive styles theory to teaching and learning may be in metacognition, that is, making students aware of their own learning practices (Coffield et al., 2004; Cools, Evans & Redmond, 2009; Sadler-Smith, 2012). By reflecting on their knowledge of their own cognitive styles and their own learning experiences, students can develop learning strategies (Sadler-Smith, 2012). This "learning about learning" helps students to become independent learners and thinkers who can solve problems in dynamic, time-pressured environments on their own initiative (Sadler-Smith, 2012). More generally, development of independent learning skills is useful in online environments where there may be little structure or support (Coffield et al., 2004; Cools, Evans & Redmond, 2009). Independent learning skills can help students to achieve higher-order learning outcomes and to develop a deep approach to learning (Garrison & Vaughan, 2008, p. 4). This 'deep' approach to learning is characterised by a desire to understand and a search for meaning. It can be achieved by organising material into a coherent whole, relating new ideas to other topics and to real-life situations, asking questions of oneself and the integration with existing knowledge (Ramsden, 2003, p. 47). It is consistent with the traditional values of higher education institutions (Garrison & Vaughan, 2008, p. 5). The deep approach can help students to move away from a structured to a broader way of thinking with greater scope for freedom and originality (Zhang and Sternberg, 2005). Authentic blogging can provide an environment for the expression of such originality (Downes, 2006).

While there are many models of cognitive styles encompassing a range of theoretical perspectives, only some are concerned with reflection. One such model has been developed by Kolb (1984). His model takes an experiential learning perspective and is based on his four-stage Cycle of Experiential Learning (Kolb, 1984). The Kolb model emphasises reflection, which is particularly associated with Reflective Observation stage in the cycle of experiential learning as shown in Figure 1:

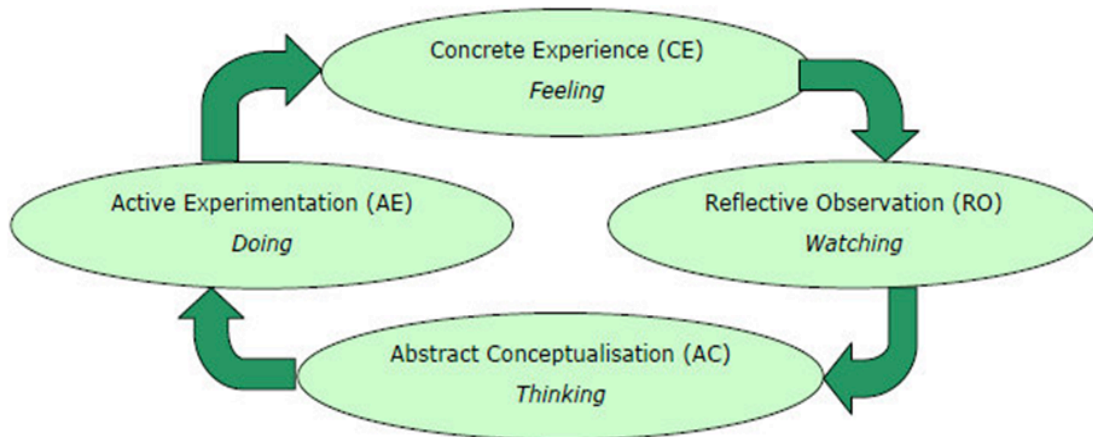


Figure 1: Kolb's Four-Stage Cycle of Experiential Learning

According to the experiential learning cycle, all learning passes through four stages (Kolb, 1984). However, learners have a preferred approach, either active, mainly trying out the skill (doing, active experimentation) or reflective, mainly watching others perform the skill (watching, reflective observation). Their approach (doing, watching) is combined with their emotional response, (thinking, feeling) (Kolb & Kolb, 2005). Learners prefer to either think about the skill (thinking, abstract conceptualisation) or experience it (feeling, concrete experience). The combination of these preferences gives rise to Kolb's four learning styles as in Table 1 (Kolb & Kolb, 2005). Reflection is associated with the assimilating and diverging learning styles (Kolb & Kolb, 2005).

	Approach to Learning	
Emotional Response to Learning	Active Experimentation AE - Doing	Reflective Observation RO - Watching
Concrete Experience CE - Feeling	Accommodating LS (CE/AE)	Diverging LS (CE/RO)
Abstract Conceptualisation AC - Thinking	Converging LS (AE/AC)	Assimilating LS (RO/AC)

Table 1: Kolb's Learning Styles (LS) in relation to his Cycle of Learning

Learners with a Converging Learning Style tend to be practical, problem-solvers who prefer technical tasks to interpersonal issues, while those with a Diverging Learning Style tend to be open-minded, imaginative and prefer to work in groups (Kolb & Kolb, 2005). Learners with an Assimilating Learning Style tend to be logical thinkers who prefer

theoretical models to practical problems, while those with an Accommodating Learning Style tend to use intuition to solve problems and prefer to deal with people rather than concepts (Kolb & Kolb, 2005). Learning style is not fixed; it arises from consistent patterns of interaction with the environment and can change over time through education and experience (Kolb & Kolb, 2005; Kozhevnikov, 2007). People may use different learning or cognitive styles in different situations (Kozhevnikov, 2007). Kolb warns that the oversimplification of the application of learning styles, can lead to the stereotyping of students (Kolb & Kolb, 2005). Students of information science are expected to have an assimilating or converging learning style as the discipline requires abstract conceptualisation (Terrell & Dringus, 2000). Terrell & Dringus (2000) found that seventy-five percent (75%) of students on an online masters' course in information science had these two style preferences and that these students were more likely to graduate. In a study of a hypermedia concept mapping system, students with assimilating and diverging learning styles performed better (Kolb & Kolb, 2005). This may be due to the traits of these two styles, namely the abilities to see multiple perspectives and to generate multiple ideas (Kolb & Kolb, 2005). According to Dedic & Markovic (2012), students with a converging learning style prefer computer-based delivery, while those with an assimilating learning style prefer print. Saeed et al. (2009) investigated an undergraduate course on web programming where blogs were used for feedback on teaching and learning issues. They found a mix of learning styles among the students and that most students exhibited a good balance between those styles. While they were not the most frequently represented, 'intuitive' learners on the Felder Soloman Index of Learning Styles (Felder & Soloman, 2007) preferred blogs as a learning tool rather than email and the VLE (Saeed et al., 2009). Intuitive learners in the Felder Soloman Index of Learning Styles are characterised as liking discovery, innovation and abstract information (Felder & Soloman, 2007). In that respect, their learning style seems similar to Kolb's converging learning style. Dedic and Markovic (2012) examined the relationship between Kolb's learning styles and learner preference for a particular graphical user interface. They found that only learners with an accommodating style exhibited such a preference. In a study of undergraduate students in courses in the Faculty of Education, students with Kolb's assimilating learning style were found to participate in discussion forums to a greater extent than those with a diverging style; other learning styles were not present in the sample of 34 students (Akkoyunlu & Soyulu, 2008). Ocepek, Bosnic, Nancovska Serbec, & Rugelj (2013) compared the learning styles of computer science students with their preferences for five different types of multimedia – animations and video, simulations and serious games, coloured learning texts, hierarchically structured content and audio. They found that all students used all types of multimedia but accommodators showed a preference for simulations and serious games and assimilators preferred audio. They caution that providing learning materials in a preferred format does not necessarily lead to an improved performance.

As can be seen by the above studies and as noted by Evans and Waring (2012), the evidence of the impact of interventions to support learning in e-learning environments is mixed and, also, dependent on the styles model being scrutinised. Pertinent to this study, they found mixed and inclusive results in relation to interventions using Kolb's learning styles. Their findings add fuel to the debate about whether e-learning should be adaptive so it is able to accommodate the needs of all learners or adapted to suit specific styles. They emphasise the former given the mixed results of studies aiming to match style of learner to

the e-learning environment, the fact that styles are inherently malleable and that all individuals have the capacity to use a variety of styles (Kozhevnikov et al., 2014).

An understanding of their cognitive styles may be more helpful to students than classifying them as a particular style type (Coffield et al., 2004; Cools, Evans & Redmond, 2009; Sadler-Smith, 2012). To this end a metacognitive model can be applied to Kolb's experiential learning theory (Sadler-Smith, 2012). The cycle can operate at the meta level of a learning model in addition to the original level of the learning experience. At the meta level learners interpret their experiences according to their perception of their styles. Reflecting on this perception can help the learner to become aware of both positive and negative aspects of their style and how their style may be holding them back. Reflection is a form both of metacognitive monitoring of experience and an experience in itself (Sadler-Smith, 2012).

In summary, this study sets out to examine the extent to which undergraduates will write an 'authentic' blog without tasks assigned by a lecturer. Hall and Davidson (2007) have suggested that the students might lack motivation for blogging in this case, whereas Downes (2004) suggested that the lack of structure would facilitate creativity, reflection and the exchange of ideas. An understanding of their own cognitive styles can help students to reflect on and develop their own learning strategies (Sadler-Smith, 2012). This is of value in higher education as reflection can lead to a deep approach to learning (Ramsden, 2003). There are many studies of reflection in blogs where the lecturer provides guidance and support (Dos & Demir, 2013; Farmer et al, 2008; Xie et al; 2008) but little investigation of reflection in authentic blogging or how this can be informed by an understanding of cognitive styles.

Research Question

The purpose of this study is to explore the educational benefits of authentic blogging for students on a multimedia and communications degree course (as described in the Participants section). Thus, the study sought to address the following research questions:

1. Will undergraduates in a university-level institution write a blog of educational value without activities being prescribed by a lecturer?
2. If so, to what extent do the students write and comment reflectively in their blogs?
3. To what extent can Kolb's model of learning styles inform our understanding of reflection in authentic student blogs?

METHODOLOGY

This section introduces the context of the study in a university-level institution, gives a profile of the student participants and describes the ethical issues involved. It then looks at the field work and the instruments Kolb's Learning Style Inventory (KLSI), two measures of reflection (one using discourse analysis, the other a student survey) and a student questionnaire before concluding with an examination of issues of bias, reliability and validity.

Participants

This study focuses on a university-level institution in a town of about 20,000 people in rural Ireland. Many of the students in this institution do not come from a background of participation in higher education. All research participants were students in the final year of a three-year Bachelor of Science degree in *Multimedia and Communications*. The entrance requirements for this degree course were passes in English, Mathematics and three other subjects in the Leaving Certificate examination.

The entire class of eleven students in the final year participated in the study. Blogs had been in use on the course for several years. This research analyses blog posts made over approximately an eighteen-month period.

The Communications lecturer who taught this course is a well-known blogger. He shares the view that blogging is a way of developing critical thinking, written communication and information literacy skills and of providing a means for personal reflection and sharing insights (Huffaker, 2005; Mackey, 2007). Like Potter (2008), blogs were used both as a medium for learning and for practical skills development. The course followed the philosophy that authentic blogging only starts when bloggers are unrestrained by class rules and that this would facilitate creativity and reflection (Downes, 2006). With this in mind the lecturer encouraged the students to blog on subjects of their own choice. There were no assigned exercises, no assessment and no particular structure. Students were encouraged to read and comment on each other's blogs.

Ethics

Analysing personal journals is a sensitive matter (Hatton & Smith, 1995) even when they are publically available as blogs. Therefore, the researcher took particular care to avoid harm, protect privacy and honour confidentiality. These are all 'moral imperatives' in the 'ACM Code of Ethics and Professional Conduct' (Association for Computing Machinery, 1992) which the researcher used as his ethical code for conducting the research. The researcher obtained approval for his research from the host institution in advance. The Multimedia and Communications lecturer facilitated this contact. The researcher also obtained ethical approval from the Open University, where he was registered as a postgraduate student at the time.

The researcher obtained prior informed consent from the research participants. He explained the nature of his research and the class activities to the students prior to their engagement in the study. The students all signed a form, consenting to participate in the research. Specifically, they gave the researcher permission to read their blogs, to analyse their contents, to analyse the questionnaires and to publish his findings in an anonymised form. The researcher committed to anonymising all personal data. To do this all student questionnaires and blogs were anonymised and identified only by a number.

Field Work

As the sample size was small and the participants were available in the Institute at the one time, the researcher decided to conduct the research in class on the Institute premises. This would give the researcher the opportunity to obtain consent and to explain the instruments. It would also help to maximise the number of participants. As good research should benefit the participants (Rugg & Petre, 2006) and knowledge of their own learning style should help the students to understand their own learning (Akkoyunlu & Soyulu, 2008; Evans & Waring, 2012; Kolb & Kolb, 2005; Saeed et al., 2009; Sadler-Smith, 2012), the researcher decided that the students should discover their own learning style.

Measuring Learning Style - Kolb's Learning Style Inventory (KLSI)

Kolb's Learning Style Inventory (KLSI) is an instrument used to determine an individual's learning style (Kolb, 1984). It was found to be dominant in higher education as the most frequently reported instrument in a wide-ranging review of articles on the application of styles within education (Evans & Waring, 2012). Other widely used instruments identified by Evans & Waring (2012) were the Study Process Questionnaire (SPQ) by Biggs, Approaches and Study Skills Inventory for Students (ASSIST) by Entwistle et al, Group Embedded Figures Test (GEFT) by Witkin et al and the Inventory of Learning Styles (ILS) by Felder et al. Of these models, both KLSI and ILS consider styles to be 'flexibly stable' learning preferences and both are concerned with reflection (Coffield et al., 2004; Evans & Waring, 2012). Of these two models, KLSI was considerably more widely used in those articles considering the relationship between styles and e-learning environments (Evans & Waring, 2012).

There is a debate about the reliability and validity of KLSI. Coffield et al. (2004) have questioned the validity of the KLSI. Its use of forced choices obliges respondents to rank all four options in order as in Table 2. Each option corresponds to one of the four phases of the learning cycle. It is not possible to rank options equally or to omit any of the options. They also question whether Kolb has managed to make all four options equally socially desirable. To reduce some of these weaknesses, KLSI can be converted from a type or categorical measure to a degree or continuous measure (Manolis, Burns, Assudani, & Chinta, 2013). However, KLSI in its standard form is widely used and has a sound basis in educational theory (Kolb & Kolb, 2005). Its norms are based on a diverse sample of 6,977 users (Kolb & Kolb, 2005). In the technical specifications, the reliability and both internal and external validity have been proven for the KLSI (Kolb & Kolb, 2005). Due the emphasis of the Kolb model on reflection, its use within communications and education programmes and its dominance within the styles literature (Dron, 2003; Tsoi, 2009), the researcher chose to use Kolb's model of learning styles for this study. Kolb's Learning Style Inventory (KLSI) has the additional practical advantages of being both free for use in education, short, and therefore more easily manageable (Kolb, 1993).

This study used Kolb's Learning Style Inventory Version 3.1 (1993). It is a paper-based questionnaire consisting of twelve sentence sets, that is, twelve statements with four options each as in Table 2, where the statement is 'I learn by' and the four options are 'Doing', 'Feeling', 'Watching' and 'Thinking'. The student ranks the four options, giving

four points to the option that most closely matches the statement and one point to the option that least matches the statement. In Table 2, the student considers that he or she learns most by thinking (rank of 4) and least by feeling (rank of 1).

Statement	A		B		C		D	
I learn by:	2	Doing	1	Feeling	3	Watching	4	Thinking

Table 2: Completed sample sentence set from Kolb's LSI

The researcher explained the basis of KLSI, its benefits to the students and how to complete it. Once the students had completed the questionnaire, the researcher showed them how to score it. They then scored their own questionnaires. KLSI is scored for each of abstract conceptualisation, active experimentation, concrete experience and reflective observation. Table 3 gives an example of reflective observation from Kolb's LSI scored by a student. In Table 3, option D was the reflective observation option for question 1, which the student ranked as their highest preference with 4 points, while option A was the reflective observation option for question 6, which the student ranked as their lowest preference with 1 point. The students added the reflective observation rankings for each of the twelve questions to give a total score, in this case, of thirty-two.

RO Option	1D	2A	3C	4C	5B	6A	7A	8C	9A	10A	11B	12C	Total
Student Ranking	4	4	3	3	2	1	3	3	3	2	2	2	32

Table 3: A sample student scoring for reflective observation (RO) on Kolb's LSI

The assimilating and diverging learning styles indicate a preference for reflective observation. This preference can be compared with the presence or absence of reflection in the student blogs. Knowledge of their style preferences can help students to understand and develop their own learning processes

Measuring Reflection - Discourse Analysis

Reflection can be subjective and difficult to measure (Moon, 2004). Researchers, such as Hall and Davison (2007), Xie et al., (2008), Dos and Demir (2013) have analysed text for reflection. Discourse analysis is a method for interpreting the meaning of a text (Sharp, Rogers, & Preece, 2007, p. 383). Hatton and Smith (1995) used discourse analysis to develop heuristics to distinguish between descriptive writing, descriptive reflection, dialogic reflection and critical reflection in student journals. These heuristics can be used to 'code' student writing into those four categories. 'Descriptive Writing' simply describes events without providing any reasons or justification. 'Descriptive Reflection' describes events and gives reasons or justifications. For example, "I chose this problem solving activity because I believe that students should be active rather than passive learners" (Hatton & Smith, 1995, p. 17). 'Descriptive Reflection' may also recognise alternate viewpoints. 'Dialogic Reflection' involves an internal discourse, exploring events and examining a range of possible explanations and solutions. 'Critical Reflection' involves an

awareness of the social and political context in which the actions and events are taking place. Discourse analysis is always difficult and liable to subjectivity and researcher bias (Rourke, Garrison, Anderson & Archer, 2001; Sharp, Rogers, & Preece, 2007). Analysis for reflection is particularly difficult as it is not clearly defined (Hatton & Smith, 1995), and categories are not explicit, making it difficult to maintain a consistent and objective analysis (Moon, 1999). This can lead to statistically unreliable results (Moon, 1999). Moon (1999) recommends simplifying the coding process. The researcher simplified his analysis by combining the categories of descriptive, dialogic and critical reflection used by Hatton and Smith (1995) as 'reflection' and by considering 'descriptive writing' as non-reflective. Therefore, to improve reliability, the researcher was able to code all the blog posts and comments as either reflective or non-reflective. Due to the subjective nature of discourse analysis for reflection, the researcher decided to compare the evidence for reflection in the blogs with a questionnaire on reflective learning.

Measuring Reflection – Student Questionnaire

Kember and Leung (2000) have devised a test instrument for measuring reflection, which the researcher used to triangulate the measure of reflective learning found by discourse analysis of the blogs. It consists of a questionnaire of sixteen statements measuring four categories of thinking. Kember and Leung (2000) derived the four categories of 'habitual action', 'understanding', 'reflection' and 'critical reflection' from the work of Dewey (1933) and Mezirow (1991). They defined 'habitual action' as an action that is performed with little conscious thought, 'understanding' as understanding without context, 'reflection' as exploring experiences to gain a deeper understanding and 'critical reflection' as an insight into values and beliefs leading to significant change (Kember & Leung, 2000; Kember, McKay, Sinclair, & Wong, 2008).

To complete the questionnaire, participants have to choose one of the options 'definitely agree', 'agree with reservation', 'no opinion', 'disagree with reservation' or 'definitely disagree' in response to each of the sixteen statements. These options are scored from five points for 'definitely agree' to one point for 'definitely disagree'. The most reflective student, who 'definitely agreed' with all statements would receive a score of five for each of the eight statements about reflection or critical reflection. This student would receive a score of forty, the maximum score possible. A student, who agreed with reservation to all eight statements about reflection, would receive a score of four for each statement or a total score of thirty-two. In this study, the students completed and scored the questionnaire under the guidance of the researcher.

Cronbach alpha values showed that the four categories were reliable (Kember & Leung, 2000). Validity was determined using confirmatory factor analysis and a good fit was found (Kember et al., 2008). The questionnaire was tested on eight classes of health science students in Hong Kong in several iterations. As the questions are not domain specific, the questionnaire is suitable for use in other academic disciplines (Kember & Leung, 2000).

For the purposes of this study, the two non-reflective categories of habitual action and understanding as defined in Kember et al. (2000, 2008) were combined as 'non-reflective' while the two reflective categories of 'reflection' and 'critical reflection' were combined as

'reflective'. For example, the statement "I sometimes question the way others do something and try to think of a better way" represents reflection, while the statement "This course requires us to understand concepts taught by the lecturer" is non-reflective. The original statements from Kember & Leung (2000) were used in this study.

To help in making a comparison with learning style, the researcher grouped the scores from the reflection questionnaire into categories. This grouping is derived from Kember's scoring scheme. A student, whose score is in the range 33-40, has an average score greater than four and has, therefore, on average 'definitely agreed' to the statements about reflection. Such a student can be considered 'highly reflective'. A student whose score falls in the range 25-32 has an average score greater than three and has therefore on average 'agreed with reservation' to the statements about reflection. Such a student can be considered as 'somewhat reflective'.

This combination of the categories allowed the researcher to compare the results from the questionnaire with the presence or absence of reflection in the discourse analysis and with the preferred learning style from KLSI.

Blogging Habits Questionnaire

To support the measures of learning style and reflection and to provide supplementary information on the students' blogging habits and their attitudes to blogging, the researcher devised a short paper-based questionnaire. This also included questions on age and gender.

Bias, Reliability & Validity

The use of standardised test instruments reduces the possibility of unintentional bias in the operation and interpretation of research. It is difficult to predict the eventual outcome of choices on the KLSI due to its design (Kolb, 1993). This makes it unlikely that students will select their answers based on a desired result. Conducting all the fieldwork in the same place and on the same day should also reduce bias.

This research was conducted on a small population, which may not be representative of a larger group. This population are all studying the same course in the same institute. Their communications lecturer is a well-known blogger who encourages his students to blog. The final year students have studied and socialised together and will have been exposed to similar learning activities in the institute. For these reasons, the ecological and population validity of the research cannot be assumed and the results may not be generalisable.

In summary, this section described the context of the study and the research methods used to measure learning style and reflection. KLSI was used to measure learning style while discourse analysis and a questionnaire were used to measure reflection among a small population of final year student bloggers on a multimedia and communications course in a university-level institute.

FINDINGS

This section presents and discusses the research findings obtained by the methods previously described. It analyses the relationship between the participant profile, blogging practices of the students, their propensity for reflection and the distribution of learning styles.

Participant Profile

Data on the students' age (Under 23 or Mature), gender, blog presence/absence and blogging habits were captured from the questionnaires. All student data were anonymised and the results transferred into worksheets for analysis. Six of the eleven final year students in the class kept a blog despite the fact that their blogs were not assessed. This included all three of the mature students. They represented half of the bloggers. Four of the bloggers were female and two male. This corresponds roughly with the numbers of females (7) and males (4) in the class. The researcher noted that one other student deleted her blog shortly after the fieldwork but before he could begin a detailed analysis. The student profiles were then compared with their scores from the KLSI.

Distribution of Learning Styles

The researcher checked the student scoring of the KLSI. Ten of the eleven final-year students (including the six bloggers) completed the KLSI correctly. The assimilating (three students) and the converging (five students) learning style preferences were more frequent in the final year than the accommodating (one student) and diverging (one student) learning style preferences (see Figure 2). (Note that the x-axis represents Active Experimentation (AE) – Reflective Observation (RO) and the y-axis: Abstract Conceptualisation (AC) – Concrete Experience (CE).)

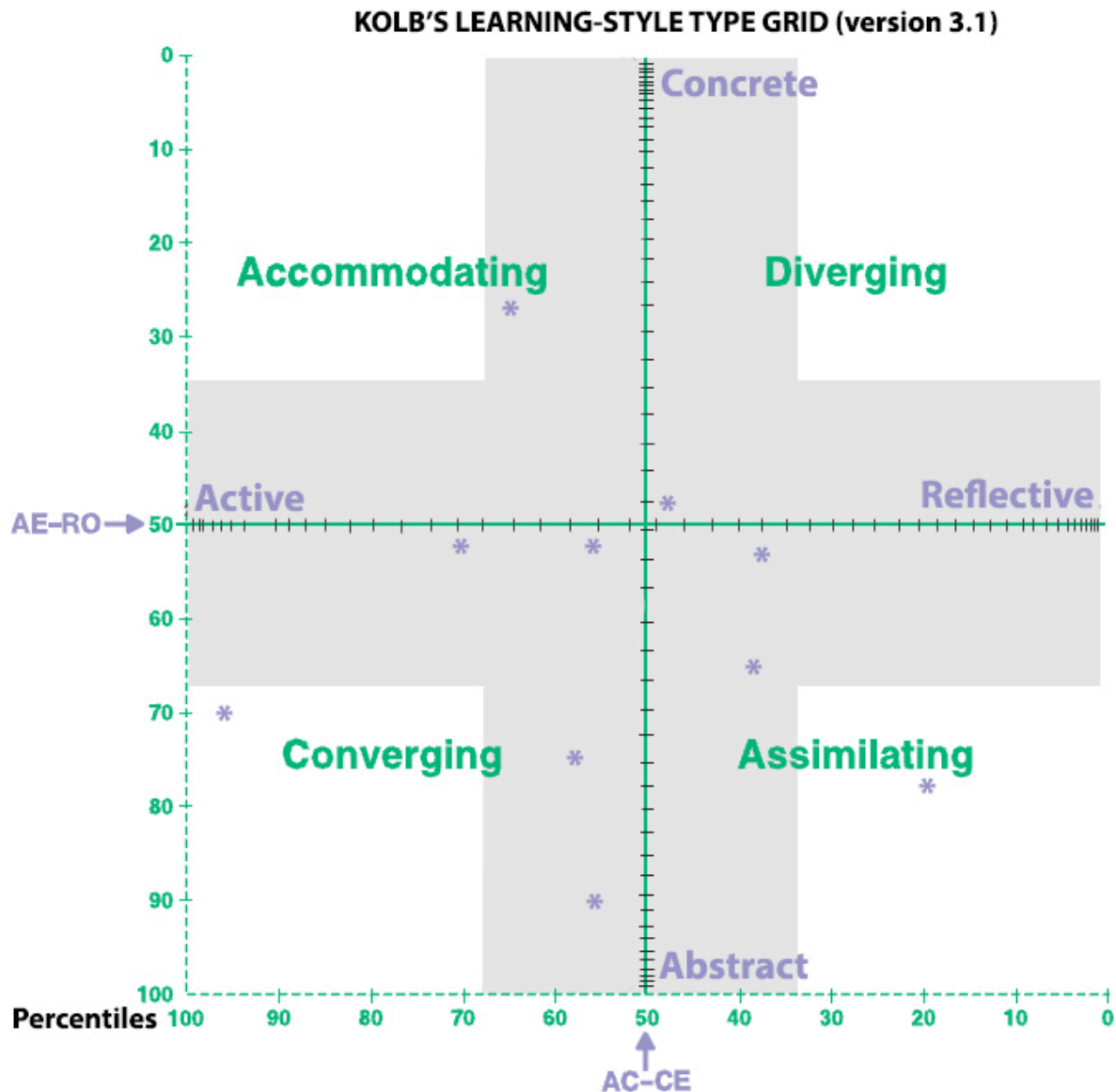


Figure 2: A Scatter Diagram of the Learning Styles of final year students (N = 10) using Kolb's Learning Style Type Grid (Kolb, 2005)

Discourse Analysis

The researcher analysed the student blogs posts and comments for evidence of reflection. The blog posts varied in quality and style. As their lecturer had encouraged the students to blog on subjects of their own choice, it is not surprising that the student bloggers wrote on a wide range of subjects, largely unconnected with the course, some humorous, some trivial and some very serious as found by Nardi et al. (2004) and Halic et al. (2010). The researcher felt uncomfortable reading some of the content as it was highly personal.

The researcher scored each post and comment as either reflective or non-reflective based on the simplified version of Hatton and Smith's criteria previously described. For example, the

following post was scored as reflective as it was considered to meet their definition of dialogic reflection that is, exploring an event through internal discourse:

“In one class we were asked how much time do we spend actually away from technology. I for one know that I can spend 5 hours online and most of that the tv is also on (I like to multi task) and that doesn't even include college. I don't think I can remember a week where I haven't been online every day at some time or another. I am away to a hotel for weekend and I know my laptop will be with me, not to mention my mobile with wifi function”.

The following post (student's own spelling) is an example of descriptive writing as it provides a factual description without any further analysis. This is categorised as a non-reflective post:

“The Puppy Rescue Centre is a place for abandon and abused dogs to take refuse. They take in strays off the street and provide them with shelter and have a strict no killing policy. Apart from comforting the wounded they do there best to re-home their dogs with new and responsible families.”

Hall & Davidson (2007) suggested that students would need guidelines and structure in order to blog. This is not borne out by this study as six of the eleven final-year students kept blogs. A total of ninety-two (92) posts were counted in the six student blogs. Of these posts, thirty-five (35) were considered to be reflective. Thirty-one (31) comments were made of which twelve (12) were considered reflective. In percentage terms, thirty-eight percent (38%) of the posts were reflective as were thirty-nine (39%) of the comments made. Student 3.3 made the most posts (32) while student 3.5 made the most reflective posts (14). Student 3.1 made the most comments (12) while student 3.5 made the most (and only made) reflective comments (7). The findings along with the bloggers profile (gender and age (under 23 (U) or mature (M)) are summarised in Table 4.

Blog ID	G	Age	#Posts	#Reflective	#Comments	#Reflective
				Posts	Made	Comments
3.1	F	U	13	3	12	1
3.3	F	M	32	7	1	1
3.4	M	U	12	5	6	3
3.5	M	M	22	14	7	7
3.6	F	M	6	2	4	0
3.7	F	U	7	4	1	0
Total			92	35	31	12
Total%				38%		39%

Table 4: Gender, Age, Posts, Comments Made, Reflective Posts and Comments

As discussed in the methods section, discourse analysis for latent categories such as reflection is always difficult and liable to subjectivity and researcher bias (Sharp, Rogers, & Preece, 2007). This researcher followed Moon's (1999) recommendations in simplifying the coding process by combining Hatton & Smith's categories of reflection. Despite its shortcomings, this method of discourse analysis gave a measure of reflective writing in the blog.

Comments & Sharing Experiences

In the study, many of the comments were brief, often reinforcing what the writer said. They were rarely critical. In the questionnaire, only one blogger said that she did not post comments on her fellow students' blogs. Two bloggers mentioned that their classmates did not like comments that disagreed with their viewpoint. Depending on the phrasing of these comments, this could be seen as unwillingness to reflect by the original blogger.

As some student bloggers received comments from non-blogging students and from people outside the class, the number of comments made differs from the number of comments received (see Table 5). Commenting was not necessarily reciprocal, for example, while Student 3.1 made twelve comments in her fellow students' blogs, she only received five comments in her own blog. In her blogging habits questionnaire she said that she found it interesting to read her fellow students' blogs, that she comments when she feels she has something worth saying and that she feels her fellow students appreciate her comments. She feels that reading blogs and comments in her own blog help her to learn. Student 3.4 received the largest number of comments from within the class. Student 3.5 mostly interacted with people outside the class, hence his score of 26 in the 'Other' column. He was considerably older than the others and seemed to have wider interests. It should be noted that students frequently made comments in their own blogs in response to comments made by others.

Student ID	3.1	3.3	3.4	3.5	3.6	3.7	Other	Total Rec'd
3.1	2	1			1		1	5
3.3	2						2	4
3.4	5		4	1	2		7	19
3.5				6			26	32
3.6	2		2			1	2	7
3.7	1				1			2
Total Made	12	1	6	7	4	1	38	

Table 5: Blog Comments Made and Received

The extensive comments suggest that most class bloggers are exchanging information and sharing insights as proposed by Dron (2003), Mackey (2007) and Halic et al. (2010).

Reflection Questionnaire

To obtain an additional measure of reflection, the researcher used the score for reflection from the students' responses to the questionnaire adapted from Kember and Leung (2000). The mean score for the eleven final year students was 29.3 for the six bloggers and 29.8 for the five non-bloggers. As discussed in the Methodology section, the questionnaire consists of eight questions which are scored from 1 to 5 depending on the student's response. A score of 4 represents "agree with reservation" to the statements about reflection. A student whose score falls in the range 25-32 has an average score greater than three which puts them into Kember and Leung's 'agree with reservation (to the statements about reflection)' or the researcher's 'somewhat reflective' category and would seem to suggest that the bloggers and non-bloggers were equally reflective. Table 6 below relates the preferred learning style of the six student bloggers from KLSI to their reflection score and category.

These scores are considerably higher than the average results obtained by Kember and Leung (2000). This may be due to disciplinary, teaching, technological or cultural differences.

Student ID	Learning Style	Reflection Score	Reflection Category
3.7	Accommodating	37	Highly
3.5	Converging	30	Somewhat
3.1	Converging	29	Somewhat
3.3	Converging	29	Somewhat
3.4	Converging	26	Somewhat
3.6	Assimilating	25	Somewhat
Mean		29.3	Somewhat

Table 6: Bloggers Learning Style and Reflection Score from Kember & Leung

Blogging Habits Questionnaire

In their blogging habits questionnaires, four out of the six students with blogs said that they enjoyed reading their fellow students' postings and five out of six felt that blogging helped them to learn. (The sixth did not answer the questions). Students can learn by reading blogs without writing posts or comments (Halic et al., 2010). Only one of the non-blogging students said that she enjoyed reading her classmates' blogs and that blogs helped her to learn. This student wrote several comments in her classmates' blogs. She was 'highly reflective' with a diverging learning style. All three mature students in year three maintained blogs. They were able to express the learning benefits of blogging clearly in their questionnaire responses, giving responses such as "providing an historical record for myself" and "sharing opinions and getting feedback".

Discussion - Blogging, Styles and Reflection

By synthesising the findings on blogging practice, learning style and reflection it can be seen that the four most prolific of the six student bloggers wrote 75% of the total posts as shown in Table 7. These four bloggers all demonstrated a preference for a converging learning style as measured by the KLSI. With five out of ten (50%) results, this is the most common learning style in the class. These four bloggers wrote 29 out of the 35 (83%) reflective posts. They also made and received all of the reflective comments. These four bloggers with the converging learning style were all found to be ‘somewhat reflective’ based on the categories derived from the questionnaire by Kember and Leung (2000).

Blog ID	Learning Style	Reflection Category	#Total Posts	#Refl. Posts	#Comments Made Total	#Refl. Comms.
3.1	Converging	Somewhat Reflective	13	3	12	1
3.3	Converging	Somewhat Reflective	32	7	1	1
3.4	Converging	Somewhat Reflective	12	5	6	3
3.5	Converging	Somewhat Reflective	22	14	7	7
3.6	Assimilating	Somewhat Reflective	6	2	4	0
3.7	Accommodating	Highly Reflective	7	4	1	0
Total			92	35	31	12
%				38%		39%

Table 7: Posts & Comments compared to Learning Style & Reflection Category

Various relationships between learning style and multimedia learning or interface preferences have been reported (Akkoyunlu & Soylu, 2008; Dedic & Markovic, 2012; Kolb & Kolb, 2005; Ocepek et al., 2013) but to the best of the researcher’s knowledge, a relationship between blogging and a converging learning style has yet to be reported in the literature. The closest findings are in Saeed et al (2009) who did not use KLSI. They found that students with a style similar to a converging learning style preferred blogs to other forms of online communication. However, that style was not dominant in the class (Saeed et al., 2009).

According to Kolb (1984), the converging learning style is associated with action rather than reflection. Based on this small sample, the preponderance of the converging learning style may suggest that a preference for reflective observation is not necessary for reflection by authentic student bloggers.

While sixty-two (62%) of the blog posts could be described as non-reflective and thirty-eight (38%) as reflective, students with a converging learning style wrote most blog posts,

whether descriptive or reflective. From this analysis (albeit a very small sample), a relationship was found between the number and reflective quality of the blog posts and learning style. According to Evans & Waring (2012), e-learning, such as blogging, should support a diversity of learning styles. Yet, the findings from this study suggest that blogging is not equally attractive and accessible to all learners and that style may play a part in this. In this case, lecturers who wish to use authentic blogging may need to provide additional support for students with some styles (Kozhevnikov, Evans, and Kosslyn, 2014). These findings and their implications are summarised in the conclusions.

CONCLUSIONS

In summary, six out of the eleven students in the final year class voluntarily kept a blog over an eighteen-month period. Their blogs contained 92 posts and 31 comments. As authentic bloggers, they wrote about a wide range of topics at levels ranging from the frivolous to the serious. Based on discourse analysis (Hatton & Smith, 1995), the majority of blog posts and comments were found to be descriptive. However, thirty-eight percent (38%) of the posts and thirty-nine percent (39%) of the comments were found to be reflective. Of the six bloggers, the four most prolific wrote 75% of the total posts. All bloggers wrote at least some reflective posts.

Ten of the eleven students in the final year class completed the KLSI correctly. Five of these students showed a preference for a converging learning style. These five students included the four most prolific bloggers, who wrote 74% of the reflective posts and who made and received all of the reflective comments. These four bloggers with the converging learning style were found to be 'somewhat reflective' based on the categories derived from the questionnaire adapted from Kember and Leung (2000). Their non-blogging classmates obtained similar results from the questionnaire. Based on this small sample, non-traditional undergraduate students will keep a blog without tasks assigned by a lecturer, will write a mixture of descriptive and reflective blog posts on topics of personal interest and will exchange ideas by commenting on each other's blogs. In particular, students with a converging learning style seem to participate in authentic blogging, using it as a means to write, reflect and discuss with their peers. These findings suggest that there may be a relationship between style and technology preference as found by Akkoyunlu & Soylu (2008), Gülbahar & Alper (2011) and Thomas & McKay (2010). Specifically, they correspond with the results of Saeed et al. (2009), who found that students with an 'intuitive' learning style on the Felder Soloman Index of Learning Styles (Felder & Soloman, 2007) demonstrated a preference for blogging. The 'intuitive' learning style has characteristics in common with Kolb's converging learning style such as an interest in discovery, innovation and abstract information. This study further suggests that students with a converging learning style are willing and able to use blogs for reflective writing and exchanging ideas in the absence of tasks prescribed by a lecturer. However, as the sample size is small further studies would be needed to confirm this finding.

Potential Future Work

Dos and Demir (2013) reported that most student bloggers on an undergraduate teacher education course showed evidence of descriptive rather than dialogic or critical reflection in their prescribed course blogs. It would be interesting to further investigate the quality of reflection by student bloggers where blogging is not prescribed.

By participating in the research and completing the KLSI, the students gained insights into their own approach to learning. It would be interesting to do a follow-up study to see if and how they benefited from this knowledge.

The study suggested that authentic blogging facilitates reflection. From an educator's perspective, if blogging is important in encouraging reflection, how can the quality of that reflection be improved and how can educators encourage all students to engage in this activity.

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