

Responses and influences: A model of online information use for learning

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Abstract

Introduction. This paper explores the complexity of online information use for learning in the culturally diverse ICT-intensive higher education context. It presents a *Model of responses and influences in online information use for learning* that aims to increase awareness of the complexity of online information use and support information literacy development.

Background. Despite increasing integration of information literacy into university curricula there are evident limitations in students' use of information associated with an information literacy imbalance between well developed IT skills & uncritical approaches, compounded by differences in cultural and linguistic experience.

Influences. This model draw insight from models of: information behaviour/seeking (Wilson, Foster, Kuhlthau), information literacy (Bruce), cross-cultural adaptation (Anderson), reflective online use (Hughes, Bruce & Edwards).

The model. Incorporates behavioural, cognitive & affective responses with cultural & linguistic influences in an action research framework that represents online information use - envisaged as the *experience of engaging with online information for learning* - as holistic, dynamic and continuous.

Conclusion. The model represents the synergy between information use and learning. It supports the development of inclusive reflective approaches to information literacy that address identified learning challenges related to information literacy imbalance and cultural & linguistic diversity.

Introduction

The connection between information literacy and learning is widely acknowledged. In higher education it supports a trend towards self-directed, research-based and online learning approaches which require a balance of digital capabilities, effective information seeking and the critical, ethical and creative use of information. However despite the increasing integration of information literacy education into university curricula around the world, research indicates significant limitations in study-related information use. An apparent information literacy imbalance is evident between many students' well developed IT skills and less developed critical approaches to information use. Significantly also in light of the internationalisation of higher education, learning and information use challenges can be further intensified by differences in students' the social, cultural, and linguistic experience.

In response to these challenges this paper offers a *Model of responses and influences in online information use for learning* which has a two-fold purpose: to represent the complexity of online

information use for learning in a culturally diverse, ICT-intensive environment; and to provide a framework for developing inclusive reflective information literacy strategies that addresses this complexity. Consequently this model reflects both a broad concern with the nature of information use and a specific concern with learners' information literacy needs. It embodies a developing conception of (online) information use as the *experience of engaging with (online) information for learning* – as a multi-faceted experience that incorporates users' context, needs, engagement and outcomes. The model draws together key elements of significant models in the fields of information behaviour/seeking (Wilson 1997; Foster 2005; Kuhlthau 2004), information literacy (Bruce 1997) and cross-cultural adaptation (Anderson 1994). In particular it emphasises the role of information literacy in learning and blends cultural and linguistic influences into the interplay of thoughts, feelings and actions in information use. It is intended to complement previous models of reflective internet searching (Edwards & Bruce 2002) and reflective online information use (Hughes, Bruce & Edwards 2006).

The paper comprises three main parts. The first - entitled *Background* - explains the purpose and context of the *Model of responses and influences in online information use for learning*. The second part – *Conceptual influences* - describes the influence of other models on the present model's development. The third part - *Overview* - discusses the structure and intended application of the model itself. In the interest of concision and clarity the *Model of responses and influences in online information use for learning* is referred to as 'the present model' in this paper.

Background to the *Model of responses and influences in online information use for learning*

Research base

This paper arises from the author's ongoing doctoral research – a study that investigates international students' experience of using of online information resources and related information literacy learning needs in a culturally diverse educational environment (Hughes 2005; Hughes & Bruce in press). Although set in Australian higher education it draws insight from the wider literature of cultural and educational diversity, information behaviour/use and information literacy. An exploration of conceptual models and their applications supports the data analysis, resulting in the *Model of responses and influences in online information use for learning* which is introduced in Figure 2 and discussed below.

Purpose of the model

Wilson (1999, p. 250) states: 'A model may be described as a framework for thinking about a problem and may evolve into a statement of relationships among theoretical propositions'. The problem addressed here concerns the complexity of - and inter-related influences on - online information use for learning in a culturally diverse ICT-intensive higher education environment. The *Model of responses and influences in online information use for learning* shown in Figure 2 provides the framework for representing this complexity and developing an information literacy approach that responds to this complexity.

Context of the model

Wilson's 1981 *General model of information-seeking behaviour* represents the circumstances that give rise to information-seeking behaviour in terms of 'the person performing a role in an

environment' (Wilson 1997, p. 552). Extrapolated to the *Model of responses and influences in online information use for learning*, 'the person' can be said to relate to university students, the 'role' to their use of online information for learning and the 'environment' to culturally diverse ICT-intensive higher education.

In the context of this paper online information resources are understood to include a wide array of materials available in electronic format from public, proprietary and institutional sources such as the World Wide Web, specialist databases, library catalogues and course websites. The QUT Library website for example provides a representative snapshot of the educational material provided by Australian universities to their enrolled students (QUT 2005).

Information use and information literacy

Definitions of information behaviour, information seeking, information use and information literacy overlap and vary in interpretation. In seeking a broad interpretation of *information use* this paper refers to it as the **experience of engaging with online information for learning**. This is understood as a multifaceted experience involving users' context, needs, actions (behaviours, information seeking), responses and influences (cognitive, affective, cultural, linguistic) and outcomes (insight, knowledge construction). **Information literacy** (in the context of this paper) is considered to be intrinsic to the experience of engaging with online information use for learning; it constitutes the understandings, capabilities and critical approaches that collectively underpin effective online information use and foster learning.

The model introduced in this paper reflects Bruce's (1997) holistic representation of information literacy as a multifaceted experience that reaches beyond digital competencies and information seeking skills to the development of critical, creative and ethical approaches to information use that promote knowledge construction and wisdom. It also supports a close connection between information literacy and learning (Breivik 1998; Bruce 1997, Lupton 2004).

Students and their use of online information for learning

The variety and complexity of online information resources pose challenges for learners and educators in Australia and elsewhere. Despite increasing recognition of the role of information literacy in learning and its inclusion in university curricula, research shows that many students either disregard or are unfamiliar with more formal information sources. Rather they tend to access material that is freely available on the Internet via search engines, blogs, wikis and bulletin boards. Importantly, this is often associated with over-confidence in their computer proficiency and/or limited critical awareness (Armstrong et al. 2001; Brown et al. 2003; Edwards 2006; Jones 2002; Logan 2004). All this contributes to what may be identified as an apparent information literacy imbalance between the students' generally strong IT skills and their frequently uncritical approaches to searching for, evaluating and using information.

These limitations may be compounded by differing cultural and linguistic experiences (Hughes 2005; Hughes & Bruce in press). International students are frequently unaccustomed to the self-directed research-based learning approaches that predominate there (Ballard & Clanchy 1997; Ramsay, Barker & Jones 1999; Samuelowicz 1987). They often have little or no previous experience of libraries and online information resources and limited information literacy (Baron & Strout-Dapaz 2001; DiMartino & Zoe 2000; McSwiney 1995).

It is important to note however that cultural and linguistic barriers to information use are not exclusively experienced by people from 'different' backgrounds. For example the inclination to save face evidenced by the reluctance to ask questions and seek help is a fairly common characteristic across cultures. Likewise it is not only people from non-English speaking backgrounds who experience linguistic difficulties such as mistyping/ misspelling search terms or struggle with discipline-specific jargon and academic English. This suggests the value of an inclusive approach to information literacy (Biggs 2003; Hughes & Bruce in press).

Conceptual influences on the *Model of responses and influences in online information use for learning*

This section outlines influences on the development of the *Model of responses and influences in online information use for learning*. Conceptually the present model draws insight from significant models in the fields of information behaviour, information literacy and cross-cultural adaptation and it complements models of reflective internet and online information use. The essential elements of each of these models, as they contribute to the present model, are highlighted below.

Revised general model of information behaviour (Wilson)

The *Model of responses and influences in online information use for learning* reflects key elements of Wilson's *Revised general model of information behaviour* (1997, p.569) with regard to its focus on information users, their information needs, their information-seeking behaviour and their context. In particular it emphasises the impact of personal and cultural influences on information use which relate to Wilson's *intervening variables*. However the present model's underlying conception of *engaging with online information* extends beyond information-seeking to encompass critical, ethical and creative use(s) of information for learning. While the present model retains the inter-connectedness of Wilson's model, its cyclical form - with no fixed start and end points - envisages flexible approaches to information use and allows for jumping and reiterating between and within phases.

Information search process (Kuhlthau)

The present model is also strongly influenced by Kuhlthau's (2004) *ISP (Information Search Process)* in relation to its: user-centredness; focus on learning; and emphasis on the close inter-relationship – or holistic 'interplay' - between behavioural, cognitive and affective responses in information seeking and their influence on all aspects of information use. The present model expands Kuhlthau's conception by incorporating cultural and linguistic influences into the interplay and by widening the perspective beyond information seeking to all aspects of engaging with online information. However its cyclical form contrasts with ISP's linear structure. While no direct correlation is intended between the six stages of ISP and the four phases of the present model, it is envisaged that the Plan-Act-Record-Reflect elements could come into play during the ISP stages.

Non-linear model of information seeking behaviour (Foster)

The impact of Foster's *Non-linear model of information seeking behaviour* (2005) on the present model is reflected in their shared conception of information use as dynamic, multilayered and non-linear. It is also felt in their focus on both the information users' experience and the contextual, affective and cognitive influences on information use. While no direct correlation is intended between Foster's three core processes and the four phases of the present model, elements of the Plan-Act-Record-Reflect cycle might be linked to 'activities' pertaining to the core processes. So

for example, within Foster's *Orientation* core process the *Reviewing* activity may be akin to *Reflect*, and *Picture building* akin to *Plan* and/or *Act*. Significantly, in view of the present model's intended information literacy application, Foster proposes that his model could be 'a holistic tool for viewing and creating an information literate person ... a framework for educators and library professionals to teach information skills' (Foster 2005, para. 37).

Seven faces of information literacy (Bruce)

The multifaceted conception of information literacy and emphasis on people's experience of using information that characterise Bruce's (1997) *Seven faces of information literacy* are intrinsic to the present model. Both reflect a holistic understanding of information use – envisaged here as *engaging with information* - that encompasses digital competencies, information seeking skills, critical understandings, knowledge construction and creative applications.

Cross-cultural adaptation process model (Anderson)

The significance of Anderson's (1994) *Cross-cultural adaptation process* model for the *present model* relates to its depiction of cultural, linguistic, affective, cognitive and behavioural influences on aspects of human experience. Notably it has been used at an Australian university to identify similarities and differences among international and local students, with a view to supporting their learning and adjustment (Ramsay, Barker and Jones 1999). The cyclical recursive structure, which signifies the continuous nature of adaptation, resonates with the present model's similar representation of information use for learning. Also the six principles of cross-cultural adaptation listed by Anderson have close parallels with those of the present model:

'It involves adjustment; it implies learning; it implies a stranger-host relationship; it is cyclical, continuous and interactive; it is relative; and it implies personal development' (Anderson 1994, p. 303).

Reflective online information use model (Hughes, Bruce & Edwards)

Hughes, Bruce & Edwards's *Reflective online information use model* (2006) shown in Figure 1 is embedded in the present model. It highlights the synergy between information use and learning and offers a framework for developing a reflective approach to online information use. It builds on Edwards and Bruce's (2002) *Action research model for reflective Internet searching*, which in turn was influenced by Bruce's earlier models for reviewing the literature (1996) and reflective information searching (1992).

The *Reflective online information use model* incorporates principles of reflective practice (Schön 1987) and action research (Kemmis & McTaggart 1988) with Bruce's *Seven faces of information literacy* (1997), which respectively integrate reflection as essential into professional development, social research and information use for learning. Of particular note here, reflective practice promotes continuous, contextualised learning by encouraging participants to reflect both 'on-action' (after completing an activity) and 'in-action' (whilst engaged in the activity). Importantly Bruce's model provides the holistic user-focused understanding of information literacy at the heart of *The Reflective online information use model*.

The model's action research influenced structure with its four inter-connected phases (*Plan*, *Act*, *Record* and *Reflect*) represents online information use as continuous and relational rather than linear. Online information use is shown to be dynamic, both in terms of the searcher's active engagement and the changing online environment in which the engagement takes place. The four key phases of the model relate to Bruce's (1997) first five conceptions of information literacy, as

follows:

- PLAN relates to the first two conceptions of information literacy - *Information technology* and *Information sources* - identified in the present model respectively as *scanning* and *sourcing information*. At this initial phase the user is concerned with investigating online resources and planning strategies for using them effectively to find information.
- ACT relates to the third conception - *Information process* - identified in the present model as *engaging with information processes*. This phase involves applying the strategies determined previously for using the online resources to find needed information.
- RECORD relates to the fourth conception - *Knowledge control* - identified in the present model as *controlling information*. This phase involves activities such as saving, bookmarking, emailing and printing information found during the ACT phase.
- REFLECT relates to the fifth conception - *Knowledge construction* - identified in the present model as *critiquing information and constructing new knowledge*.

The purpose and outcomes of online information use are embedded in the centre of the model:

- USE INFORMATION CREATIVELY AND ETHICALLY relates to sixth and seventh conceptions of information literacy - *Knowledge extension* and *Wisdom* - identified in the present model as *gaining novel insights* and *using information wisely*.

The *Plan-Act-Record-Reflect* 'meta-cycle' can support any number of inter-related 'mini-cycles' within each phase. Learners are able to engage flexibly with information and they may pass through part or all of the meta-cycle once, several or many times depending on their information need(s). Although sequential progression through each phase is the suggested 'ideal' approach, information users may jump phases, backtrack or exit mid-way. Also they may complete one or several mini-cycles within a particular phase. Importantly - and in accordance with the concept of reflective practice (Schön 1987) – reflection occurs continuously 'in-action' within each mini-cycle, as well as 'on-action' at completion of the meta-cycle. In other words learners are encouraged to reflect both on their information needs, process(es), actions and results whilst involved in any of the phases of the online information use cycle, as well as retrospectively on the whole experience and its outcomes.

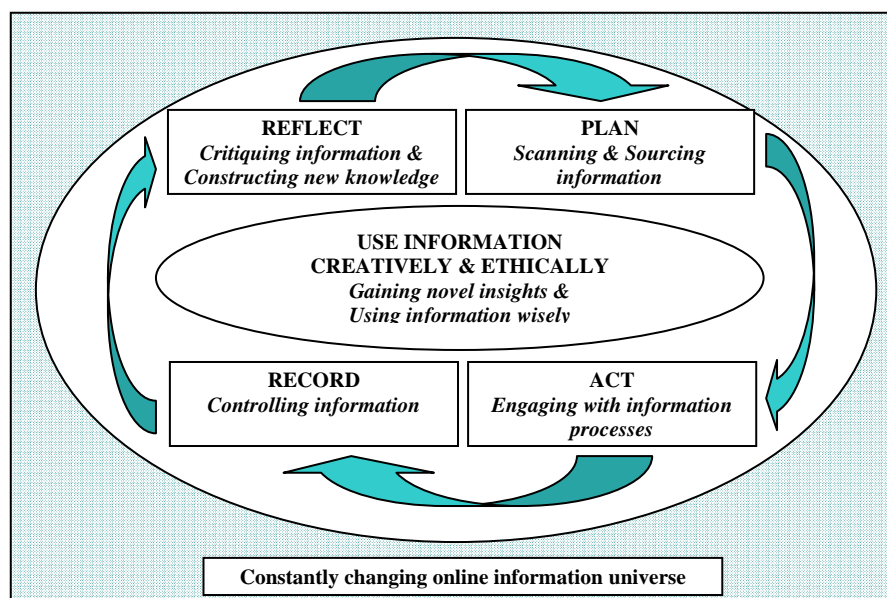


Figure 1 – Reflective online information use model (Hughes, Bruce & Edwards 2006)

Summary of related models

As stated previously the *Model of responses and influences in online information use for learning* draws on elements of significant models in the fields of information behaviour, information literacy and cross-cultural adaptation. These models, their key contributing elements and their significance to the present model are summarised in the following table.

Related models	Contribution to the <i>Model of responses and influences</i>	Significance to the <i>Model of responses and influences</i>
<i>Revised general model of information behaviour</i> (Wilson 1997)	Conception of information use as a continuous process, importance of users' situation and needs, and intervening variables	Underpins understanding and representation of information behaviour and use
<i>Information seeking process</i> (Kuhlthau 2004)	Conception of interplay of behavioural, cognitive & affective influences in information seeking	Holistic view of information seeking incorporating behavioural, cognitive & affective influences, application to learning
<i>Non-linear model of information seeking</i> (Foster 2005)	Conception of information use as non-linear and multi-layered, focuses on information users' experience	Suggests an alternative approach to modelling information seeking – conceptual relationships rather than stages
<i>Seven faces of information literacy</i> (Bruce 1997)	Conception of information literacy as a multi-faceted phenomenon, focus on the user's information experience	Extends beyond information behaviours and information seeking skills to a holistic view of information experience, suggests link between information use and learning
<i>Cross-cultural adaptation process</i> (Anderson 1994)	Integration of behavioural, cognitive and affective influences, cyclical representation of cross-cultural adaptation	Extends awareness of behavioural, cognitive, affective and cultural influences beyond the information domain
<i>Reflective online information use model</i> (Hughes, Bruce & Edwards 2006)	Action research-influenced structure, integration of principles of Bruce's <i>Seven faces of information literacy</i> model	Common conceptual ground with the present model, promotes holistic understanding of information use/information literacy

Table 1: Summary of conceptual foundations of the *Model of responses and influences in online information use for learning*

Overview of the *Model of responses and influences in online information use for learning*

This section presents an overview of the *Model of responses and influences in online information use for learning* and discusses its intended purpose and application

Introducing the *Model of responses and influences in online information use for learning*

The *Model of responses and influences in online information use for learning*, which is introduced below in Figure 2, is learner-centred. It addresses evident limitations in students' use of information for learning which are associated with an imbalance between their digital competencies and less developed critical approaches and also with differences in cultural and linguistic experience (Armstrong et al. 2001; Brown et al. 2003; Hughes 2005; Jones 2002). It aims to represent the complex nature of information use for learning in a culturally diverse ICT-intensive higher education environment and also to support the development of reflective information literacy approaches.

The present model is based on a broad conception of the *experience of engaging with online information for learning*. As explained above it reflects essential elements of significant models in the fields of information behaviour, information literacy and cross-cultural adaptation. In particular it highlights the inter-relationship – or *interweaving* - of behavioural, cognitive, affective, cultural and linguistic aspects that colour the experience of online information use. Thus it resonates with Kuhlthau's (2004) conception of the interplay of behavioural, cognitive & affective elements in information seeking.

In terms of structure and emphasis the present model is intended to complement the *Reflective online information use model* (discussed above and shown in Figure 1). The latter's purpose and form are embedded in the present model and represented by the *Plan-Act-Record-Reflect* labels. While the previous model provides a framework for developing reflective online information use the present model draws attention to significant cultural and linguistic influences and the corresponding need for inclusive approaches to information literacy education.

The *Plan-Act-Record-Reflect* framework of both these models resembles the action research cycle. Both represent information use as dynamic and continuous and support unlimited information use meta-cycles and mini-cycles. They are underpinned by the holistic understanding of information literacy represented by Bruce's *Seven faces of information literacy* model (1997). The key elements of the present model - *Plan, Act, Record, Reflect* and *Engaging with online information for learning* - again relate respectively to the seven conceptions of information literacy identified by Bruce (1997) as: *Scanning and Sourcing information; Engaging with information processes; Controlling information; Critiquing information and Constructing new knowledge; Gaining novel insights and Using information wisely*.

The conceptual centre of the model - *Engaging with online information for learning* – represents both the purpose and outcomes of online information use, which inter-relate with the phases of *Plan-Act-Record-Reflect*. The model's rectangular border encapsulates this experience within a culturally diverse ICT-intensive higher education environment.

The cyclical structure of the model implies the continuous, flexible and holistic nature of online information use. It also signals that each and every *response* and *influence* may come into play during any of the information cycle phases (both meta-cycles and mini-cycles). As an example of linguistic influence, a student's limited English language proficiency may inhibit their effectiveness in: determining appropriate search terms at the PLAN phase; entering valid search terms at the ACT stage; evaluating and selecting resources at the REFLECT stage; and ultimately understanding the material to gain insight and construct new knowledge.

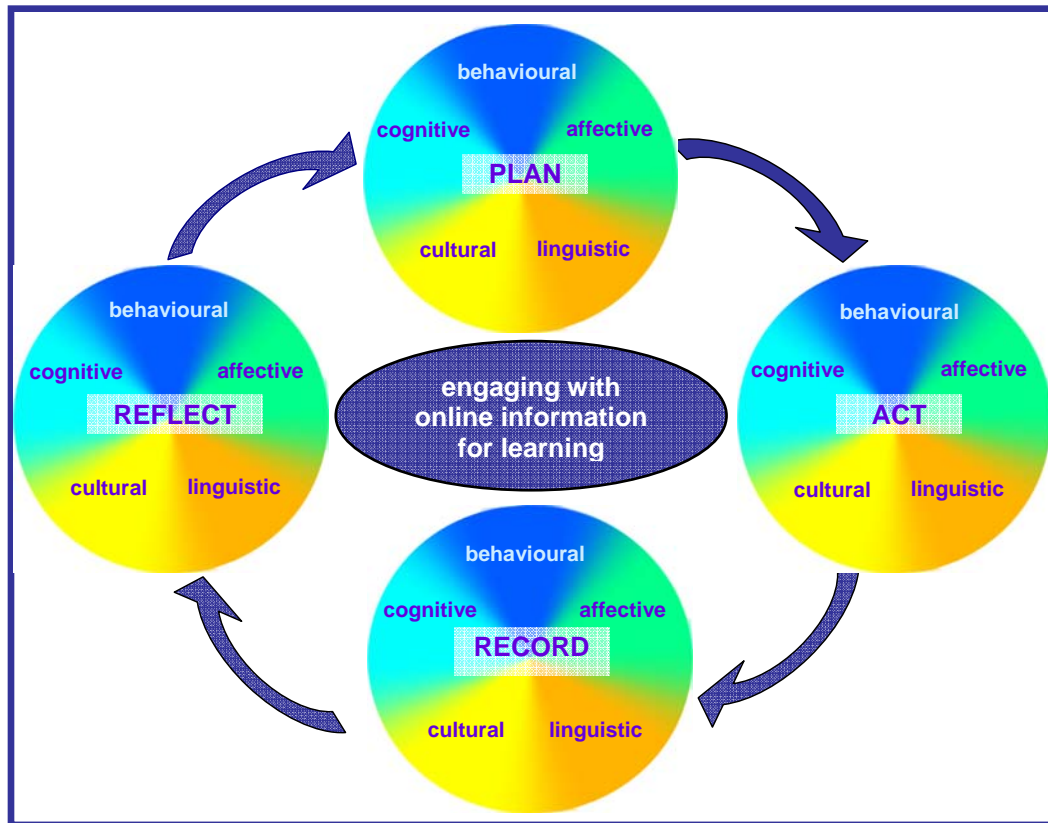


Figure 2: Model of responses and influences in online information use for learning

The distinctive features of this model are the segmented circles that indicate the inter-relationship – or interweaving – of the various elements that colour the experience of engaging with information for learning. These aspects are of two types – *responses* (shades of blue) and *influences* (shades of yellow). *Responses* here correspond with the behavioural, cognitive and affective aspects of Kuhlthau’s *ISP* model (2004). *Influences* are the cultural and linguistic aspects that are added to the interplay in this model.

The five aspects are not mutually exclusive – like the segments of the circles they overlap and blend. The different *influences/responses* have varying impact on information use for learning depending on the situation. Face-saving for example can have strong cultural (*cultural influence*) and emotional (*affective response*) connotations - perhaps associated with educator-learner relationships and academic anxiety. Language limitations (*linguistic influence*) may also sometimes relate to face-saving responses, such as reticence in class and reluctance to seek help. Any of these experiences could affect information seeking behaviour (*behavioural response*), such as abandoning a search.

Applying the *Model of responses and influences in online information use for learning*

In an information literacy context the present model alerts learners and educators to the complex multifaceted nature of online information use for learning in a culturally diverse environment. It draws attention to the impact of cultural and linguistic influences on information use, their inter-relationship with behavioural, cognitive and affective influences and especially the need to consider them in the development and implementation of information literacy education. Thus it

complements the *Reflective online information use model* (Hughes, Bruce & Edwards 2006) which provides a basic framework for developing an inclusive reflective approach to information literacy education as proposed elsewhere by Hughes and Bruce (in press).

The action research influenced structure of both models and their focus on learning outcomes rather than skills fosters reflective information use. The flexibility, critical thinking and problem-solving that they promote could assist students to thrive as information users and learners in the constantly changing online environment.

Summarising the *Model of responses and influences in online information use for learning*

The *Model of responses and influences in online information use* introduced in Figure 2 seeks to illustrate the complex nature of the experience of using – or engaging with - online information for learning. It highlights:

- The multifaceted nature of engaging with online information for learning, that encompasses information skills (information searching and processing) and the critical, ethical and creative use of information for knowledge creation
- The inter-relatedness - or interplay - of behavioural, cognitive, affective responses and cultural and linguistic influences in online information use
- The dynamic, culturally diverse environment of online information use

The key features of the model are that it is:

- Cyclical and relational in form
- Holistic: Its broad conception of information use – described here as the experience of engaging with online information for learning - extends beyond information behaviour/information seeking and reflects the multifaceted conception of information literacy of Bruce's (1997) *Seven faces of information literacy*.
- Inclusive: It emphasises the impact of cultural and linguistic influences on information use, and the need to allow for them in addressing information literacy learning needs
- Reflective: It encourages critical, holistic approaches to information use beyond digital competencies and information seeking skills.
- User-centred: It focuses on the experience rather than the process of information use.

Perhaps most significantly the present model fosters learning. It supports an inclusive reflective approach to information literacy development as proposed by Hughes and Bruce (in press). While models of information use tend to look at the person as “a finder, creator and user of information” (Case 2002), this model and the previous models of internet and online resource use (Edwards and Bruce 2002; Hughes, Bruce and Edwards 2006) view the information user primarily as **learner**.

Conclusion

This paper responds to evident learning challenges encountered by university students, relating to their generally uncritical approaches to information use – expressed here as an information literacy imbalance - and their differing cultural, linguistic and educational experience. The *Model of responses and influences in online information use for learning* presented here has a two-fold aim - to both increase awareness of the complexity of online information use for learning and support teaching and learning. On a conceptual level this model envisages online information use as *engaging with online information*, as a multifaceted experience which encapsulates learners'

information needs and context, their information seeking and use of information and their learning outcomes. On a practical level the model offers a framework for developing inclusive and reflective information literacy strategies. In this way the *Model of responses and influences in online information use for learning* represents the synergy between information use and learning and underpins a holistic information literacy approach that fosters learning in the culturally diverse ICT-intensive higher education environment.

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