




## One model to rule them all, one model to bind them? A critique of the use of accessibility-related models in post-secondary education

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### ABSTRACT

The focus of this paper is to examine the role that models play in informing the approach that post-secondary education institutions take to developing inclusive and equitable practices that successfully and appropriately address the access needs of disabled students in relation to information and communications technology. It reviews the current approach of the post-secondary education community to using models to inform their accessibility practice with respect to ICT and explores the answers to three related questions: 1. What alternatives to the Universal Design model exist? 2. How do we differentiate between different accessibility models? 3. Do we need more than one model to inform accessibility practice? One key outcome of this exploration is a proposed evaluation framework that can help post-secondary institutions make informed decisions about the most appropriate model for them to adopt. The paper concludes that such a framework has potential to transform practitioners' approaches to accessibility by suggesting that excellence may not require a 'blanket approach' in which just one model 'rules' or dominates their thinking.

### KEYWORDS

ICT; IT; accessibility; disabilities; -post-secondary education; models

## Introduction

The focus of this paper is students with disabilities, Information and Communications Technology (ICT) and the practices developed within post-secondary education (PSE) institutions to support students with disabilities in their use of ICT. We define disability broadly to include physical, sensory, mobility and cognitive disabilities, but also acknowledge that disability does not define a single homogeneous group – students with different disabilities and within disability groups show substantial variation in terms of their access related experiences and attainment. In particular, we are interested in those disabled students who meet the regular admissions requirements of PSE institutions; these encompass colleges, technical schools (that offer certificate programmes) and universities. We know that students with disabilities in PSE are less likely than non-disabled students to stay enrolled, earn higher degrees and secure employment (Advance HE, 2018; Jorgensen et al., 2015; Ma, Pender, & Welch, 2016). We also know

that disabled learners can experience discrimination when institutions expect them to use inaccessible ICTs as part of their studies or fail to implement potentially supportive ICTs (Fichten, Asuncion, & Scapin, 2014; Fichten, Olenik-Shemesh, Asuncion, Jorgensen, & Colwell, 2020).

We define ICT broadly to include online learning (both distance and blended learning), assistive technologies (AT) such as screen-readers and alternative keyboards, general use technologies such as tablets and mobile phones, administrative applications such as registration systems, and social networking applications such as Facebook and Twitter, as well as specific application technologies such as statistical packages. We also know that the majority of university and college websites in the US and worldwide that are tested have many accessibility faults and that this inaccessibility persists over time (Kimmons, 2017; Seale, 2014). This is despite the fact that accessibility standards exist and many countries have disability discrimination legislation in place that directly or indirectly requires educational institutions to address how their use of technologies mediates disadvantage for their disabled learners (Seale, 2014; Seale, Burgstahler, & Fisseler, 2019).

## Background

The authors of this paper are partners in a Leverhulme Trust funded International Network called Ed-ICT. Partners from the US, Canada, UK, Germany and Israel have been meeting regularly over the past three years in order to seek ways in which research can inform practice (and vice versa) in the field so that the disadvantage that disabled learners experience can be reduced or, better still, eliminated. A central premise of the Ed-ICT International Network is that the community needs to develop a critical approach to developing inclusive and accessible practices with respect to the provision of ICT in PSE institutions. One key area that we suggest needs particular critiquing is the way the community currently uses accessibility models.

### *The PSE community approach to developing accessibility practice – a sole focus on universal design*

In the 1990s, the introduction of disability and accessibility related legislation in many countries (e.g. The Americans with Disabilities Act, 1990) prompted practitioners to look to accessibility related standards and guidelines (e.g. The Web Content Accessibility Guidelines of the World Wide Web Consortium) as tools to transform and guide their practice. These tools were however very technical and complex in nature and did not cover aspects of accessibility particularly relevant to PSE such as pedagogy. This has led many practitioners to look for alternative tools – particularly models – to guide practice. With respect to the focus of this paper, we understand ‘models’ as practical or conceptual representations of the systems and processes within PSE that are required to promote the use of supportive ICTs that contribute to successful education and employment outcomes for disabled students. Models may describe current practice (what is currently happening) or prescribe best practice (what should be happening).

Arguably, the most common model that practitioners have turned to for guidance when considering the accessibility of ICTs in PSE is Universal Design (see, for example Linder, Fontaine-Rainen, & Behling, 2015; Rao, Edelen-Smith, & Wailehua, 2015). There are different

variants of Universal Design (UD), with different titles, but all of them have been influenced in varying degrees by the work of the Centre for Universal Design which conceives Universal Design as: 'the design of products and environments to be usable by all people to the greatest possible extent' (Center for Universal Design, 1997). Seven principles were formulated to underpin this concept: equitable use, flexibility in use, simple and intuitive design, perceptible information, tolerance for error, low physical effort, and size and space appropriate for approach and use. These principles, though tied to architecture and the physical environment, maintain the core precept of keeping as many users in mind as possible in the design and development process. And by so doing, 'Universal design provides a blueprint for maximum inclusion of all people' (Story, Mueller, & Mace, 1998, p. 13). Broadly speaking, Universal Design in educational contexts is an approach characterised by proactive design if the educational products and environments offer full benefits to individuals with a wide range of characteristics.

Burgstahler (2015) and others discuss what they see as common threads through all the strands of Universal Design in education, organised broadly into four overlapping categories: instruction, services, physical spaces and ICT. Firstly Universal Design is about anticipating the needs of a diverse group of learners. This does not mean designing an application that is fully usable by everyone; it is not about eradicating the need for accommodations, but minimising the need for them. Secondly, Universal Design is positioned as inclusive because it values diversity and equity (Hockings, 2010); thirdly, disabled students are not required to continually advocate for access or accommodations (Hadley, 2011); and finally, it offers an alternative way of conceptualising accessibility as something that can be part of the design of an application rather than considered as an after-thought once an individual with a disability encounters a barrier. Universal Design provides a broad approach that may, in implementation, make use of accessibility standards and guidelines; in the case of applications to ICT, the most commonly applied guidelines are the international Web Content Accessibility Guidelines presented by the World Wide Web Consortium.

There have been some criticisms of UD. Several accessibility researchers have come out against Universal Design or what they label a 'one size fits all' approach. For example, Kelly, Nevile, Draffan, and Fanou (2008) argued that the goal of universal access, although appealing, is unachievable. Douce and Porch (2009) and Douce, Porch, and Cooper (2010) argued that whilst a universally designed resource may seem to be universally accessible, it may still present challenges for some individual learners. Sampson and Zervas (2011, p. 354) argue that 'The main drawback of this approach is that, typically, resources may be accessible by everyone but optimal for no one.' While Gkatzidou and Pearson (2009, p.98) argued that 'an equivalent learning outcome, rather than a universally accessible single resource, meets the needs of individual learners more appropriately'. Despite these Seale (2014, 2017a, 2017b) observed that Universal Design dominated the discourse in practitioner focused publications. Seale (2014, 2017a, 2017b) also identified many examples where practitioner-focused publications were citing supposed evidence that UD 'worked' but when she examined the evidence in detail herself, it had either been misinterpreted or misrepresented. This led Seale to argue that the concepts underpinning Universal Design for Learning are so powerful that it is rare to find a practitioner who will oppose or critique it. In other words, there is an unquestioned assumption that there is only one model to choose from: Universal Design.

The overarching aim of this paper is to test this assumption. Our purpose is not to criticise the UD model, nor to come out in favour of an alternative to UD. Rather it is our intention to enable practitioners to make informed decisions about the model(s) they are using. It is our contention that significant questions need to be addressed before the community reaches the conclusion that UD is the preferred solution or panacea for addressing the exclusionary practices that students with disabilities experience as they use or attempt to use ICT in PSE. These questions include:

- (1) What alternatives to the UD model exist?
- (2) How do we differentiate between different accessibility models?
- (3) Do we need more than one model to inform accessibility practice?

These are some of the questions that were addressed at the first meeting of the Ed-ICT International Network in Seattle in March 2017. We brought together a range of stakeholders including students with disabilities, faculty, researchers, ICT companies and AT/access service providers. Drawing on presentations, panel discussions and world-café reflections, and wider research literature, we will outline and discuss our response to these questions and the implications the answers have for accessibility practice. As part of this discussion, we will outline and justify a proposed evaluation framework that we suggest can help PSE institutions make informed decisions about the most appropriate model(s) for them to adopt.

### **What alternatives to the ud model exist?**

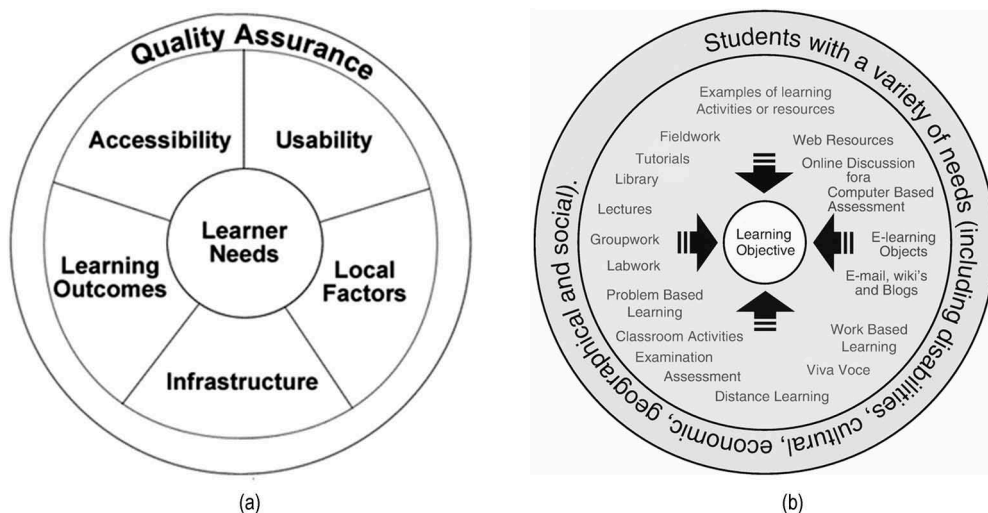
Seale (2017b) presented the results of a literature review she undertook which sought to identify what other accessibility models relevant to the provision of ICT in PSE have been proposed. She identified eight alternatives to UD. These were labelled by their originators as models or frameworks. However, as the terms appear to be used interchangeably and are not given clear definitions, Seale included all of them in her review. The majority have been developed by UK or European researchers and practitioners. In this section, we will provide an overview of the eight models. Some focus narrowly (e.g. particular stakeholders or a particular impairment), others more broadly (e.g. institution-wide practices). An overview of the similarity and differences of the nine models can be found in Table 1. We will now consider each model in more detail.

#### ***Holistic model of accessibility for e-learning applications<sup>1</sup>***

Kelly et al. (2004) proposed a holistic model for e-learning accessibility, which places the learner at the centre of the development process (see Figure 1(a)). Kelly et al. use the holistic model to argue against the pursuit of universal solutions. Instead they argue for solutions that are tailored to take into account the individual's specific needs, institutional factors, the subject discipline and the broader cultural and political factors. Kelly et al. (2008) go on later to refine their model to argue that a learner-centric model would place learning objectives at the centre (see Figure 1(b)). They also articulate in more detail the context in which this model might take place by emphasising that e-learning solutions will need to take into account both online and offline learning activities and resources (blended learning). The holistic model appears to ignore the perspectives of stakeholders

**Table 1.** An overview of the similarity and differences of nine accessibility models.

Model/Criterion	Key publications which introduce and justify the model	Which stakeholder is the target of the model in terms of the practice that the model will be applied to?	What is the ultimate goal of the model?	Does the model embrace or reject the notion of universal solutions?
Universal Design for Higher Education Holistic Model	Burgstahler (2015) Kelly, Phipps, and Swift (2004) Kelly et al. (2008)	Faculty Faculty	To minimise the need for disabled students to have to ask for accommodations. Solutions that are tailored to take into account the individual's specific needs, institutional factors, the subject discipline and the broader cultural and political factors.	EMBRACE REJECT
The VIVID (Vision Impaired using Virtual IT Discovery) Model	Permvattana, Armstrong, and Murray (2013)	Faculty	To make it easier to identify potential solutions to the access barriers commonly faced by vision impaired students.	NEITHER
Composite Practice Model	Leung et al. (1999)	AT service providers	To offer a framework to help PSE institutions assessing their response to the AT needs of disabled students.	NEITHER
Staff Development Model	Papadopoulos, Pearson, and Green (2011, 2012)	Staff developers	To support academics to develop accessible and inclusive online-materials.	NEITHER
The Model of Accessibility Services Provision for Students with Disabilities in Higher Education EU4ALL	Kouroupetroglou, Pino, and Kacorr (2011) Boticario et al. (2012) Douce et al. (2010)	Faculty and Institutional service providers Faculty and Institutional service providers Faculty and Institutional service providers (e.g. library, AT services, student support services)	The implementation of a range of services within a PSE institution (not just AT services) that might support disabled students. 1) Enhance the learning experience of disabled students by presenting learning materials that are appropriate for and matched to modality and end-user devices preferences. 2) Provide a wide range of services that an institution can adopt to ensure that the needs of learners who have disabilities are most appropriately supported. Encourage all relevant stakeholders to develop and enhance their practice by taking into account all relevant factors that mediate an institutional response to accessibility: the stakeholders; the context (drivers and mediators); and how the relationship between the stakeholders and the context influences the responses made and the accessibility practices developed. Enable a PSE institution to reflect and assess how well it is doing.	EMBRACE REJECT
Contextualised Model of Accessibility	Seale (2006)	All stakeholders within a PSE institution		NEITHER
Model of Professionalism in Accessibility	Montandon, Arjona, and Weiermair (2010)	Senior managers in an institution		NEITHER



**Figure 1.** (a) Early version of holistic model of e-learning accessibility. (b) Later version of holistic model of e-learning accessibility.

other than students and perhaps faculty. Although this model is designed for e-learning applications, it may be adapted to apply to ICT access more generally.

### ***The VIVID (vision impaired using virtual IT discovery) model for e-learning applications<sup>2</sup>***

Permvattana et al. (2013) offer their own alternative holistic model, which they developed specifically for e-learning environments for the vision impaired. The stimulus for this development was the argument that, whilst models such as those proposed by Kelly et al. (2008) provide valuable input into the design of specialised e-learning environments for the vision impaired, they are open to too much 'subjective interpretation' when applied in practice. They therefore attempt to provide a more detailed model, which they assert would make it easier to identify potential solutions to the access barriers commonly faced by vision impaired students. The model they propose incorporates various aspects of other models but is also underpinned by insights gained from observations and interviews with vision impaired students and teachers (see Figure 2). At the centre of the model are the components or resources that need to be made accessible: the physical classroom, the virtual classroom and the curriculum. Around this core is a layer of local factors that will influence accessibility decisions: learning outcomes, learner characteristics and social elements. The external layer of influencing factors or drivers includes institutional factors, legal requirements, standards and guidelines, and evaluation, feedback and enhancement. Whilst this model claims to focus on visual impairment, it appears to be generic enough that with some adaptation it could cater for a wider range of students.

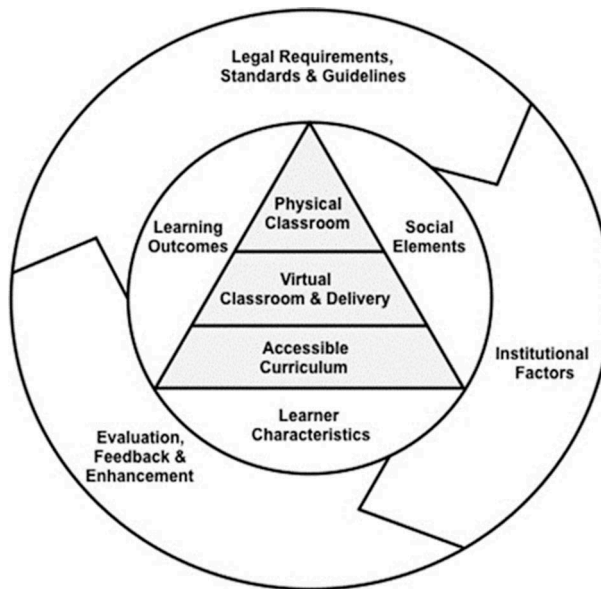


Figure 2. The VIVID (Vision Impaired using Virtual IT Discovery) Model.

### ***Composite practice model for AT service delivery***

Disabled students do not just interact with faculty in physical or virtual classrooms. They often interact with AT or access services who support them to acquire and use specialist technologies, or to request accommodations. It would therefore make sense for models to exist that guide the process for acquiring AT. Leung et al. (1999) developed a composite model to describe and explain the practice in regard to AT service delivery in PSE settings across Australia. There were three main components to the model: (1) policy funding; (2) the players (stakeholders) and (3) the process of assessing students for their AT needs. Leung et al. (1999) argue that this model can serve as a checklist for PSE institutions in assessing their response to the AT needs of students with disabilities. This model for AT service delivery recognised that there are multiple factors to consider: that assessment for AT may involve screening or a more diagnostic evaluation; that there is a full range of available AT from low tech to high tech that varies in cost; and that there should be utilisation of mainstream service provision whenever possible.

Whilst the focus of this model is narrow, what it does do is highlight the contribution of a range of stakeholders including administrators, student services, lecturers, librarians, IT services and AT specialists. In addition, like the contextualised model (see later section) the composite model acknowledges the powerful influence of external drivers such as policy and funding on practice. Furthermore, the model acknowledged that a cyclical process exists of eligibility, assessment, selection, training and reassessment, which has the potential to be useful in a practice model of service delivery.

### ***A staff development model<sup>3</sup>***

The development of accessible practices within PSE relies on faculty and other staff having the knowledge and skills necessary to change and improve what they do. Staff development

is therefore an important element of accessible practice. It would therefore make sense for models to exist that guide the design and delivery of staff development initiatives.

Papadopolous, Pearson, and Green (2012) propose a provisional staff development framework for supporting academics to develop accessible and inclusive e-materials. There are four main elements to their framework (see Figure 3). The first they call *framework components*: raising awareness; improving understanding and improving skills. The second element is the *processes*, which are required in order to raise awareness, enhance understanding and improve skills. Thirdly, Papadopoulos et al. (2011) propose a training *procedure* comprising two main elements, which, through the adoption of the identified processes, function as a means to achieve the framework's components: accessibility simulations and a 'Tutor Accessibility Support Kit' (TASK). Finally, Papadopolous et al. (2012) argue that culture change within an institution will not occur without individual self-reflection and collaboration with others. Like other models, the staff development framework acknowledges the influence of external drivers such as legislation and internal drivers such as institutional or individual intentions. Unlike other models, it does not explicitly incorporate different stakeholders, nor does it position itself in relation to universal or individualistic approaches to accessibility.

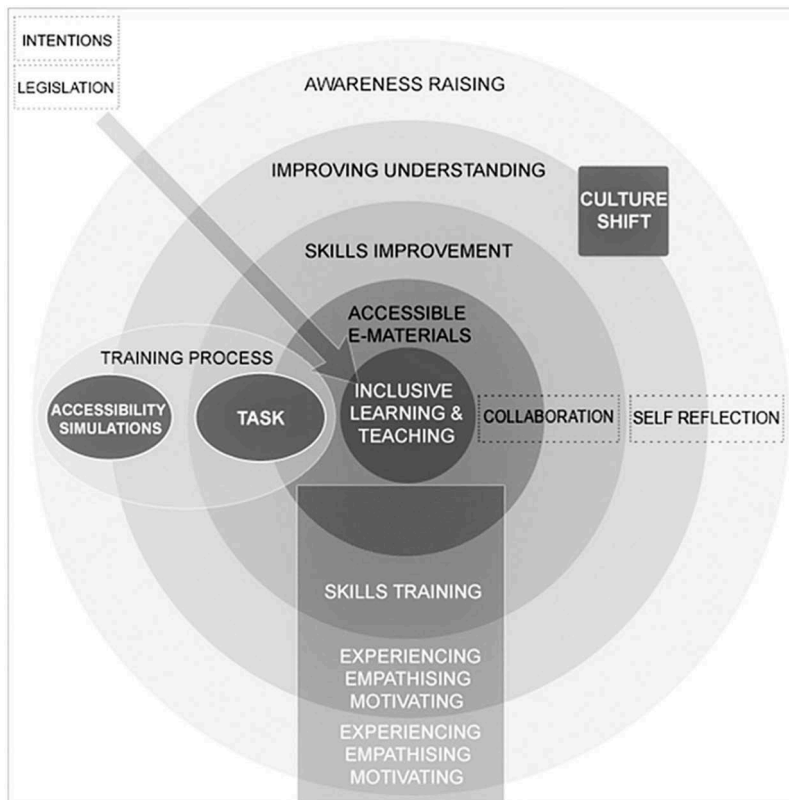


Figure 3. A staff development framework for inclusive learning design.

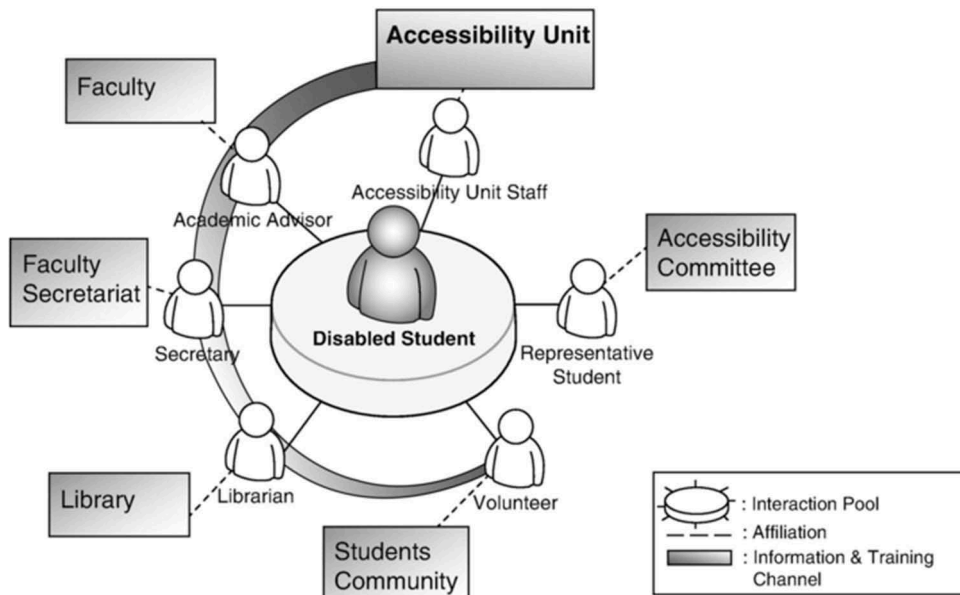


### *A model of accessibility services provision for students with disabilities in higher education<sup>4</sup>*

The model of accessibility services attempts to describe how a range of services within a PSE institution (not just AT services) might support disabled students. Kouroupetroglou et al. (2011) propose a model of accessibility services which they argue takes into account both the 'Design for All' (a term used synonymously with UD) and the 'Individual Accommodation' approaches. However, they do not explicitly illustrate how the two approaches have underpinned their model. The main pillar of this model is the 'Accessibility Unit' which provides a number of supportive services, arranged in a three-tier architecture according to their 'proximity' to the student: (1) accessibility services addressed directly to the student; (2) accessibility services applied to the student's environment, and (3) accessibility promoting services. Like the contextualised model of accessibility (see later section) this model seeks to identify the stakeholders who mediate the relationship between a disabled student and the different services such as academic advisor, librarian and student representative (see Figure 4). Unlike the contextualised model of accessibility, Kouroupetroglou et al. have implemented their model of the Accessibility Unit in practice; applying it for several years in the University of Athens, the largest PSE institution in Greece.

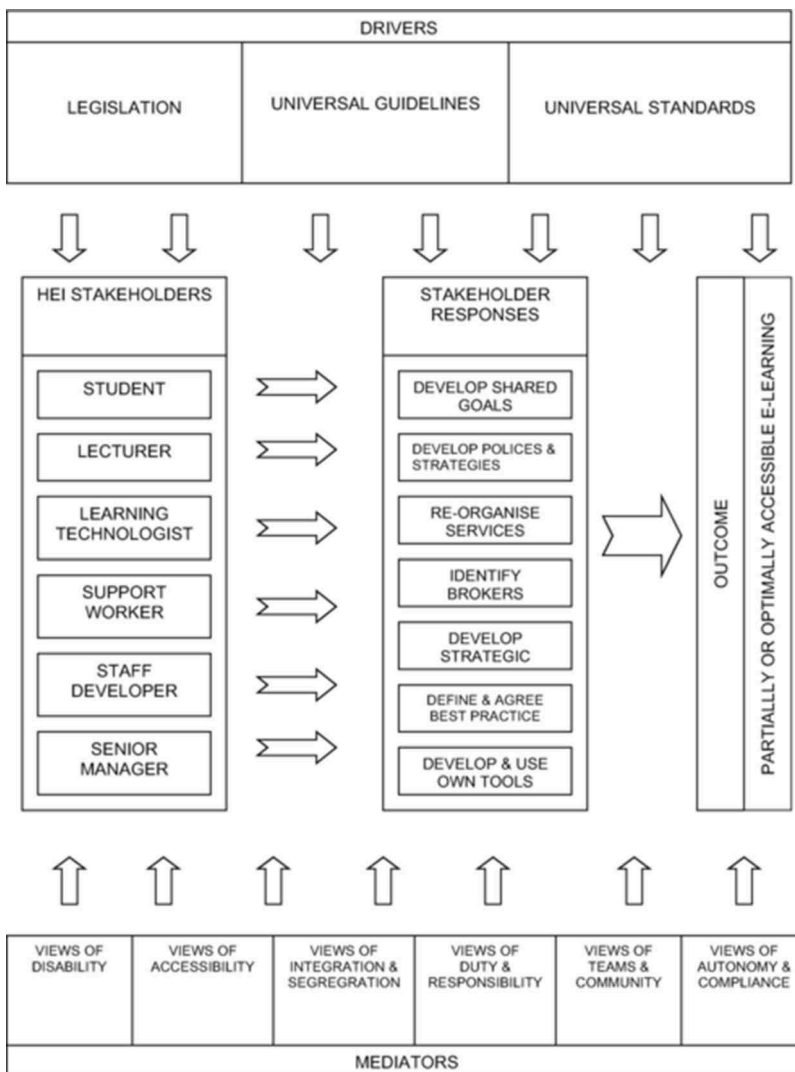
### *A contextualised model of accessible e-learning practice<sup>5</sup>*

Seale (2006) proposed a model of accessible e-learning practice that takes into account all relevant factors that mediate an institutional response to accessibility: the stakeholders; the context (drivers and mediators); and how the relationship between the stakeholders and



**Figure 4.** The stakeholders who mediate the relationship between a disabled student and the accessibility unit.

the context influences the responses made and the accessibility practices developed (see [Figure 5](#).) This model stipulates that the extent to which e-learning material and resources is accessible will be influenced by how all the stakeholders within a PSE institution respond to external drivers for accessibility such as legislation, guidelines and standards. This response will be mediated by stakeholders' views and understanding of disability, accessibility and inclusion; duty and responsibility; autonomy and freedom; and teamwork and community. The accessibility practices that develop out of these responses will vary depending on the stakeholders and the context in which they are operating, but they essentially depend on stakeholders taking ownership and control as well as developing personal meaning from externally imposed impersonal mandates. Examples of such practices within the Open University in the UK include the creation of Faculty Accessibility Specialist roles (Slater, Pearson, Warren, & Forbes, 2015) and a Special Needs Development



**Figure 5.** The contextualised model of accessibility.

Group (SNDG) within Library Services (Mears & Clough, 2015). The practice of Faculty Accessibility Specialists involves: increasing disability awareness among academics and support staff responsible for curriculum content; supporting production teams to embed accessibility into curriculum design and production; helping to deliver individual adjustments for content and assessment post-production; and advising faculties and support teams about subject-specific anticipatory and individual adjustments. The practice of the SNDG involves supporting students via the library helpdesk and liaising with academics to embed library resources and digital and information literacy skills into modules.

Whilst the model of accessibility services is descriptive, reflecting existing practice within one institution, the contextualised model is conceptual – suggesting an ideal practice.

### *The EU4ALL framework<sup>6</sup>*

The EU4ALL framework emerged from a four-year European project that developed a general framework to address the needs of accessible lifelong learning in PSE consisting of several standards-based interoperable components integrated into an open web service architecture aimed at supporting adapted interaction to guarantee students' accessibility needs (Boticario et al. 2012). The framework aimed to (1) enhance the learning experience by presenting learning materials that are appropriate for and matched to modality and end-user device preferences, such as mobile devices or AT used with a desktop computer, and (2) provide a wide range of services that an institution can adopt to ensure that the needs of learners who have disabilities are most appropriately supported.

Douce et al. (2010) describe the EU4ALL framework as both conceptual and practical. The conceptual elements of the framework are two-fold. Firstly, they conceptualise an approach to designing accessible learning that they call individualised design or designing for adaptability. They position this approach as radically different from the Universal Design approach. Secondly, through a study of different organisations and interviews with key stakeholder groups across Europe, they have produced a broad ontology of services which they suggest is a conceptual map or presentation of ideal institutional processes which have the potential to inform the creation of new services. This conceptual framework underpins the technical or practical framework in which existing standards are used to define and implement an open and extensible architecture of services for Accessible Lifelong Learning.

(See [Figure 6](#)) Like the contextualised model, the EU4ALL framework emphasises the involvement and co-operation of a number of different stakeholders.

### *A model of professionalism in accessibility<sup>7</sup>*

One interesting outcome of the EU4ALL project was the development of the four stage model of professionalism in accessibility (see [Table 2](#)) which can be perceived as operating at the macro level. The premise underpinning this model is that accessibility has a broad impact. This means that as well as systems and software, organisations also need to consider the policy and indeed philosophy they hold towards how to meet the challenge of accessibility (Montandon et al., 2010). It is argued that the model can encourage campus leaders to reflect on organisational direction and offers a way for an

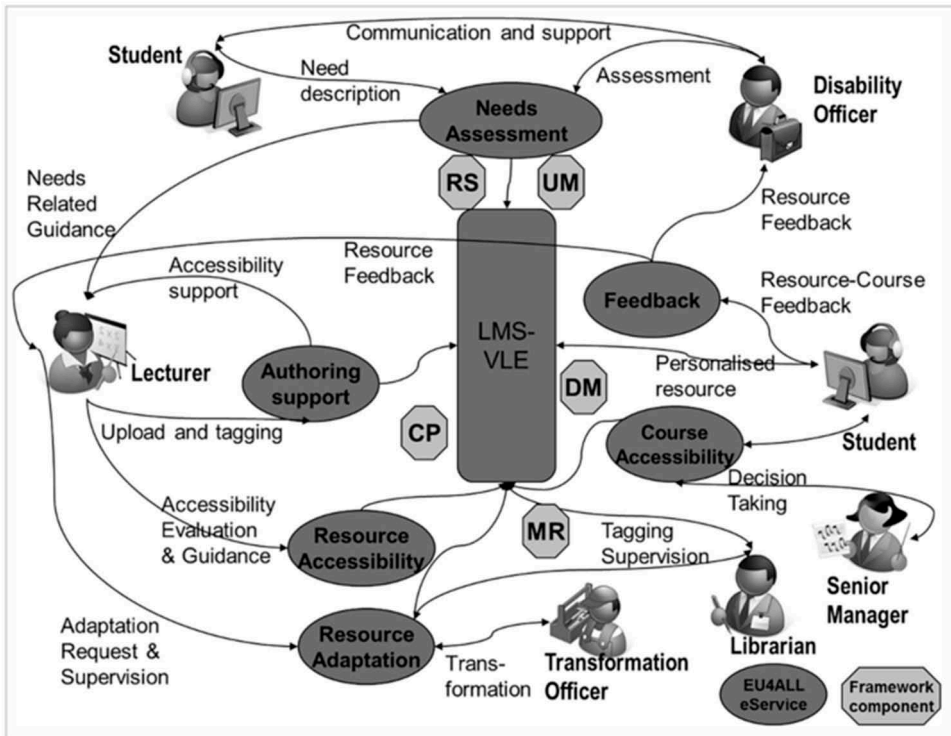


Figure 6. The EU4ALL Framework.

institution to benchmark itself against four tiers, from initial intervention to professionalism (McAndrew, Farrow, & Cooper, 2012).

### How do we differentiate between different accessibility models?

Along with the identification of eight accessibility models, in addition to UD, comes the task of differentiating between them in order to choose which one(s) might be the most appropriate to apply in practice. During the Seattle Ed-ICT Symposium, participants talked about both the function and nature of models. They spoke of three particular purposes: to inspire, to describe and to guide (University of Washington, 2017). For many of our participants, whilst inspiring practice was important to them, they were concerned that models that were more theoretical (i.e. based on hypotheses that are not necessarily proven about what makes good practice) would be less helpful than those that were more pragmatic (i.e. informed by actual practice). Whilst distinguishing between models based on their nature and function may be a helpful start, we would suggest that these criteria are rather too vague to help practitioners make informed decisions. We offer an evaluation framework based on four criteria: context, focus, validity and efficacy.

**Table 2.** A model of professionalism in accessibility.

Intervention	Intervention/ institutionalisation	Institutionalisation/ professionalism	Professionalism
Low level of accessibility practice (T1)	Medium level of accessibility practice (T2)	Substantial level of accessibility practice (T3)	Outstanding level of accessibility practice (T4)
<ul style="list-style-type: none"> <li>• Responsibility and roles unclear, ambivalent</li> <li>• Low awareness by senior management</li> <li>• Low level of accessibility practice</li> <li>• Weak legal frameworks</li> </ul>	<ul style="list-style-type: none"> <li>• Low awareness and responsibility of management, accessibility no priority</li> <li>• Considerable activity for students with disabilities by single persons</li> <li>• Existing practice not institutionalised</li> <li>• Ad hoc solutions to ad hoc problems</li> <li>• Weak legal frameworks</li> </ul>	<ul style="list-style-type: none"> <li>• Responsibility of senior management clear, accessibility a priority</li> <li>• Community of Practice with high level of institutionalised processes</li> <li>• Strong legal requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Responsibility clear</li> <li>• High priority of accessibility</li> <li>• Institutional processes and stakeholder involvement</li> <li>• Development of policies</li> <li>• Evaluation of implementation</li> <li>• Legal framework strong driver</li> </ul>

### *Distinguishing between models based on context*

A key aspect that practitioners might instinctively use to differentiate models from one another, is whether the model can be easily applied to their own working contexts, for example whether they can be applied to online learning, campus-based learning, open learning or distance learning. All models, with the exception of the composite practice model, were developed to inform online learning practice. However, not all models make it explicit whether they can be applied to campus, distance or open learning. Just three models go beyond the traditional focus on campus-based learning. For example, key UD advocates such as Burgstahler have incorporated distance learning into their descriptions and discussions of how UD can be implemented (see, for example Burgstahler, 2002). In addition, an important partner in the development of the EU4All and the Professionalism models was the Open University in the UK, where both models were piloted (see, for example McAndrew et al., 2012). We are not suggesting that if a model has thus far only been described in the context of campus-based learning, that it is not applicable to distance and open education. Neither would we wish to see a ‘not invented here’ attitude develop where practitioners automatically dismiss any model that was derived from an institution other than their own. Rather we are arguing that practitioners need to make informed decisions and part of this entails doing as much reading and research as they can about a model and the contexts to which it has been applied so far. This, along with information about institutional focus, validity and efficacy (see following sections), will enable them to take a more rounded view as to the applicability of a model to their own practice.

### *Distinguishing between accessibility models based on levels of institutional focus*

Seale (2017b) proposed that UD and the eight additional modules that she had identified could be differentiated by judging whether they operated at one of three levels (see Table 3):

- (i) *Micro level*: the practices involved in making all learning resources and activities (all teaching) accessible



**Table 3.** Differentiating accessibility models based on the level of their focus.

Name of Model or framework	Focus	Level
Universal Design for Learning/Instructional Model	Online/Blended learning resources and activities	Micro
Holistic Model	Online/Blended learning resources and activities	Micro
The VIVID (Vision Impaired using Virtual IT Discovery) Model	Online/Blended learning resources; internal and external influencing factors	Micro/Macro
Composite Practice Model	Service Level: AT Services	Meso
The Staff Development Model	Service Level: Staff Development	Meso
A Model of Accessibility Services Provision for Students with Disabilities in Higher Education	Service Level: Accessibility Services	Meso
EU4ALL	Service Level: E-services	Meso/Macro
Contextualised Model of Accessibility	Institutional Level	Meso/Macro
Model of Professionalism in Accessibility.	Institutional Level	Macro

- (ii) *Meso level*: the delivery of services within a PSE institution that plays a role in promoting the use of supportive ICTs that contribute to successful education and employment outcomes for disabled students
- (iii) *Macro level*: the institution in which those services (meso) and practices (micro) take place, and the internal and external factors that influence or drive the institution's development and organisation of those services and practices.

Using this framework Seale suggested that institutions needed to implement more than one model in order to ensure that ICT-related accessibility and inclusion issues were addressed across the whole of a university or college. Seale also argued that the nine accessibility models could be evaluated (and therefore distinguished) on their validity and efficacy; where validity is understood as the extent to which the model is logically or factually sound and cogent, and efficacy is understood as the extent to which the models are capable of producing the desired effect.

### *Distinguishing between accessibility models based on validity*

Seale (2017b) evaluated whether the models were logically or factually sound and cogent by examining how the models were derived and what evidence there is that they have improved practice or outcomes for disabled students (see Table 4). Her critique reveals that the models and frameworks vary considerably in terms of how they were derived. The majority have used a review of literature in some way to inform development (e.g. the contextualised model). Some go further than this to include data derived from surveys or observations (e.g. EU4ALL and VIVID). The developers of the model of accessibility services provision claim that the model is derived from an analysis of student requirements, but they provide no evidence of this. They do not present data from a survey of their own students and they provide no detailed literature review of existing studies that have examined disabled students' needs in relation to ICT and PSE.

The extent to which the models and frameworks are derived from professional practice is very limited. Although not explicitly stated, the holistic model and the provisional staff developmental model appear to be derived from the professional experience or judgement of the model developers who have many years of experience working in the field. For example, the originators of the staff development framework have a considerable amount of experience developing certain aspects of their framework, such as accessibility simulations and the TASK (Papadopoulos et al., 2011), and as such their model is underpinned by professional understanding. What would strengthen this framework is rich, detailed descriptions and evaluations of how this framework has been implemented in one or more PSE institutions. Just two of the nine models, however, have used explicit practice examples to inform development (the UD and composite models).

With regards to evaluating the evidence available concerning whether the models or frameworks actually work – whether they have helped to inform or improve practice or student outcomes – evidence exists for only two of the nine models. This evidence is however of varying or questionable quality. For Universal Design, the wide-scale implementation of the model means that there is a wide range of descriptive case studies available. It is only relatively recently however that quasi-experimental trials have been conducted (e.g. Roberts, Satlykgylyjova, & Park, 2015). For the EU4ALL model, some survey



**Table 4.** An overview of the validity and efficacy of the nine models and frameworks.

Model	Validity			Efficacy	
	How were they derived?	What evidence is there that they have improved practice or outcomes?	Level of granularity (detail)	Implemented in practice	Yes – wide-scale
Universal Design/Instruction	Literature review, practice examples, professional judgement	A little	3	Yes – wide-scale	
Holistic Model	Literature review, professional judgement	None	2	Unclear	
VIVID	Literature review, observations of students, interviews with staff and students	None	1	No	
Composite Practice Model	Literature review, survey, practice examples	None	2	Unclear	
Staff Development Model	Literature review, small scale pilots of some components, professional judgement	None	2	No	
Model of Accessibility Services Provision	Analysis of student requirements	None	1	Yes – in one institution	
Contextualised Model EU4ALL	Literature review, socio-cultural theory, large scale survey	None	1	No	
Model of Professionalism	Literature review, large scale survey	A little	2	Piloted in two institutions	
	Literature review, large scale survey	Unclear	2	Piloted in at least one institution	



results suggest that the principles of the model were evaluated positively by stakeholders. McAndrew et al. (2012) provide an overview of how they collected information from stakeholder groups to evaluate e-services at the Open University, which had been designed using the EU4ALL framework. Utilising an illuminative evaluation framework, they used focus groups, a remote learner survey and laboratory-based user studies to collect information from students and staff. Data from the focus groups revealed that both disabled and non-disabled students were enthusiastic about the e-services, saying it gave them more control over the way learning content is presented. Staff were also positive, but concerned over implementation. Whilst illuminating, this data is not definitive evidence that the model is effective and further evaluation is needed.

### *Distinguishing between accessibility models based on efficacy*

In judging the efficacy of the models and frameworks we need to evaluate their capacity for producing the desired result or effect by examining how detailed the models are (i.e. their level of granularity) and how widely the models have been implemented in practice. In judging the level of granularity Seale (2017b) argued that we should look for four different levels of detail:

- (1) *Level 1*: Description of overarching principles, components and processes
- (2) *Level 2*: Examples (which may be hypothetical or real) given to illuminate the principles, components and processes
- (3) *Level 3*: Descriptions of the model or framework in action – typically provided by practice-based case studies
- (4) *Level 4*: Detailed critical evaluation of strengths and weaknesses of the model

Using this set of questions and criteria the nine identified accessibility models can be critiqued (see Table 3). We have found evidence that just four of the models and frameworks have been implemented in practice and for three of these, the implementation was limited to pilot work as part of research and development projects (EU4ALL, the model of professionalism; the model of accessibility service provision). For example, to further explore the framework, the EU4ALL project attempted to illustrate its operation with two different systems and sites: the Moodle Virtual Learning Environment, used by the Open University in the UK, and the dotLRN Virtual Learning Environment, used by Universidad Nacional de Educación a Distancia (UNED) in Spain. The professionalism model was used explicitly in discussion with a range of stakeholders at one pilot institution, the Open University. The stakeholders included senior managers, disability service providers and IT specialists (McAndrew et al., 2012).

Permvattana et al. (2013) acknowledge that the VIVID model has not yet been fully applied in new and different e-learning environments and that such applications are likely to suggest ways in which the model might be enhanced. Whilst the contextualised model has been widely cited in academic and research literature, there is no concrete public evidence that it has been implemented in practice. This is despite the fact that the Open University in the UK adopted the book in which the model was first discussed (Seale, 2006) as a core text for a professional development module called 'Accessible Online Learning: Supporting Disabled Students'. Over the course of eight or nine years many practitioners

with a responsibility for student support in PSE institutions have studied the module and in their assignments reflected on the application of the model to their own practices. These reflections are, however, not published widely. The contribution of the contextualised model therefore remains at the conceptual level.

Applying the granularity criteria, eight of the nine models and frameworks reached level 2 (giving examples to illuminate the ideas and principles). For the UD model and its variants, there is a vast amount of information available that offers hypothetical/real examples and illustrations of the principles (see, for example, Burgstahler, 2002; Zeff, 2007). Judge and Floyd (2011) offer e-learning examples for three of the UD principles. For example, principle 1 suggests that the lecturer provide multiple representations of the same information, such as digital text read by text-to-speech software. Universal Design is the only model or framework for which there exist descriptions of the model or framework in action – typically provided by practice-based case studies (Level 3 granularity) (see, for example Burgstahler (2015)).

### **Do we need more than one model to inform accessibility practice?**

In arguing for the adoption of an evaluation framework to enable us to differentiate between accessibility models, we are not proposing that practitioners use the results of any evaluation to choose one model in preference to another. Rather, we argue that there may well be value in combining models and adopting a multi-model approach, in which case, decisions about which models to combine could be usefully informed by evaluations concerning the similarities, differences, strengths and weakness of each model in the combination. One issue in particular that requires further examination is that of compatibility. For example, can the EU4ALL (Meso/Macro) model really be combined with UD (Micro level), when EU4ALL embraces individualism rather than universalism? It might, however, be compatible with the holistic model which is positioned as being individualistic rather than universal (Kelly et al., 2008, 2004). In addition to navigating the universal-individualistic dichotomy, one related challenge for those contemplating combining models relates to how they conceptualise disability – whether as located within the individual student or within the environment that the student has to operate. This dichotomy is often associated with the medical versus social model of disability debate and it is this debate that Seale (2006) was referring to when she positioned ‘views of disability’ as one important factor that mediates accessibility practice within her contextualised model. It is our contention that accessibility practice can be usefully underpinned by a combination of disability models and accessibility models.

### ***Two practice examples of combining disability models with accessibility models***

At the Seattle ED-ICT symposium, two network partners, Alice Havel from Canada and Sheryl Burgstahler from the US shared how they and their colleagues combined accessibility and disability models in their approach to accessibility. Alice described how practitioners in Quebec use The Human Development Model (which reflects both the social and interactional model of disability) alongside UD. (Havel, Fichten, King, & Jorgensen, 2017). The Human Development Model – Disability Creation Process (HDM-DCP) originated in Quebec and is a conceptual model commonly used for categorising disabilities and

developing policy (Fougeyrollas, Cloutier, Bergeron, Côté, & Saint-Michel, 1998). It recognises a ‘disabling situation’ as an interaction between personal and environmental factors that impact on participation in society, without minimising the importance of the impairment. This model, however, has a limited influence in education as eligibility for funding services is based solely on a medical model that requires a documented diagnosis. Government guidelines for service delivery in post-secondary institutions suggest a needs-based organisational model when determining accommodations, taking into account the student’s strengths, abilities and needs, and emphasising the support required to eliminate environmental barriers. A significant increase in the number of post-secondary students with special needs, the prohibitive cost of psycho-educational assessments and a more diverse and inclusive society explain why UD is slowly gaining acceptance among service providers and faculty in Quebec.

Sheryl Burgstahler described how the University of Washington (UW) integrates a social model of disability (see ‘Values’ in Figure 7) and UD (see ‘Approach’ in Figure 7) within its institution-wide approach to accessible practice (Burgstahler, 2017). In outlining how the values of social justice underpin their approach Sheryl explained that much of the work in providing access to individuals with disabilities at the UW, like most PSE institutions in the United States, has involved the self-disclosure of a disability and appropriate documentation to a disabilities services office followed by the approval of accommodations by that office which is shared with faculty and staff, who must do their part in implementing them. Typical accommodations include sign language interpreters, extra time and alternative locations for exams, and remediation of inaccessible websites, documents, videos and other IT. Much of this work is based on the medical model of disability which focuses on individual functional limitations and how an inaccessible product or environment can be altered to make it more accessible to someone with these limitations. The UW has however made gradual steps towards focusing more on the product (e.g. a website) or environment (e.g. a location where computers are placed for student use) and how it can be proactively designed to be accessible to a broad audience, thus minimising the need

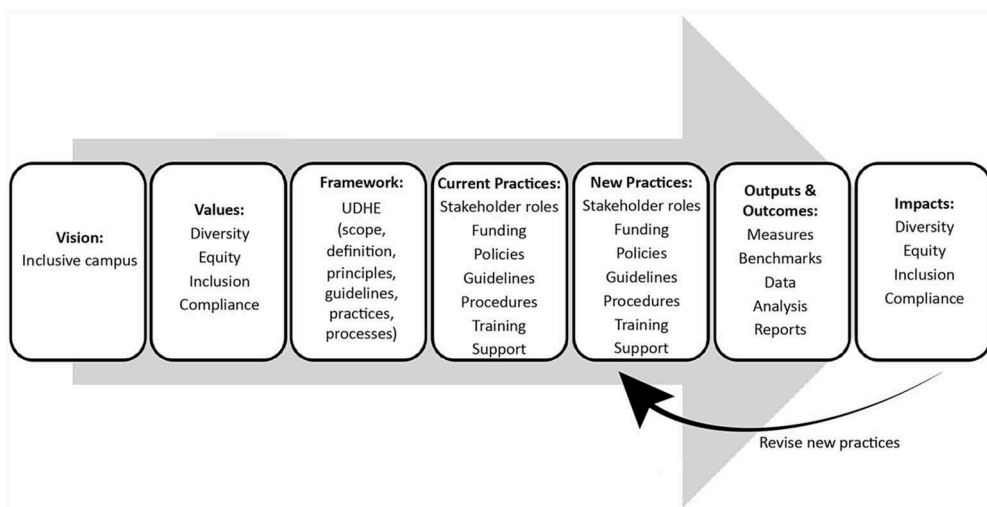


Figure 7. The University of Washington approach to accessibility.

for accommodations for specific individuals with disabilities. For UW, therefore there is compatibility between the social model of disability and UD. Sheryl also considers that the UW approach integrates various aspects of other models presented in this paper. Clearly,

**Table 5.** A framework for evaluating accessibility models in the context of ICT-related practice in PSE.

For each model being considered ...	Questions to seek answers to	Possible Answers	Tick all that apply	Tick all that you require in order to be convinced to apply the model
Context	Which educational context can or has the model been applied to?	Campus-based Distance Learning Open Learning Online Learning Blended Learning		
Focus	At what practice 'level' can the model operate?	<i>Micro level:</i> the practices involved in making all learning resources and activities (all teaching) accessible. <i>Meso level:</i> the delivery of services within a PSE institution that play a role in promoting the use of supportive ICTs that contribute to successful education and employment outcomes for disabled students. For example AT services, accessibility services, e-services, or staff development programmes. <i>Macro level:</i> the institution in which those services (meso) and practices (micro) take place, and the internal and external factors that influence or drive the institution's development and organisation of those services and practices.		
Validity	How was the model derived?	Literature review Practice descriptions (case studies) Professional judgement Observations of students Interviews with staff and/or students Small scale survey Large scale survey Small scale pilots of some or all components Large scale pilots of some or all components Analysis of student requirements Theory		
	What evidence is there that the model has improved practice or outcomes?	None A little A moderate amount Extensive		
Efficacy	How detailed are the models (what is their level of granularity)?	<i>Level 1:</i> Description of overarching principles, components and processes. <i>Level 2:</i> Examples (which may be hypothetical or real) given to illuminate the principles, components and processes. <i>Level 3:</i> Descriptions of the model or framework in action- typically provided by practice-based case studies. <i>Level 4:</i> Detailed critical evaluation of strengths and weaknesses of model.		
	Has the model been implemented/ piloted within a post-secondary institution?	No or unclear Yes – in just one institution Yes – in between two and ten institutions Yes – it is in wide-scale use (more than ten institutions)		

UD is embraced as a central approach for addressing all applications of ICT, but it shares elements of the three models presented that specifically focus on making e-learning accessible to students with disabilities. Furthermore, the process for providing AT for individuals at the UW is much like the AT service delivery model and the approach in the staff development model includes aspects of what the UW addresses in its 'training practice'.

## Conclusion

In this paper, we have reviewed the current approach of the PSE community to using models to inform their accessibility practice with respect to ICT and suggested that it could be expanded if the community was more aware of the range of the models that exist along with their strengths and weaknesses. To assist this expansion we have compared and contrasted nine models and offered an evaluation framework that can help PSE institutions make informed decisions about the most appropriate model or models for them to adopt. (See Table 5) By applying our proposed evaluation framework to the nine identified models, it would seem reasonable to conclude that further development and evaluation work is needed. This would allow for a more convincing case to be made for one or more of the models to have a genuine potential to help develop practices that can, through the use of ICT, successfully alleviate disadvantage for students with disabilities. We have also provided practice-based examples to support our suggestion that institutions may benefit from (1) adopting more than one model in order to ensure practice across the whole institution is addressed, and (2) combining models of disability with models of accessibility. This paper makes an original contribution to knowledge by challenging assumptions regarding the best way to address the access needs of disabled students. Excellence may not require a 'blanket approach' in which just one model 'rules' or dominates the thinking of PSE practitioners.

## Notes

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*Dr Sheryl Burgstahler* founded and directs the DOIT (Disabilities, Opportunities, Internetworking, and Technology) Centre and the Access Technology Centre (ATC) at the University of Washington in Seattle, WA, USA.

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