

A Framework for Supporting Postsecondary Learners with Psychiatric Disabilities in Online Environments

Scott Grabinger

University of Colorado Denver, USA

Scott.Grabinger@gmail.com

Abstract: Elena has a psychiatric disability: bipolar (manic/depressive) disorder. Daniele suffers from depression. Both are serious cognitive disorders that have significant effects on learning, especially learning online. One of the problems students with psychiatric disabilities encounter is finding support in online environments, especially when 10, 50, 100, or even 6000 kilometers from the originating university. Students with disabilities represent a growing number of students in postsecondary education. As the opportunities for online education continue to grow exponentially, so does the number of students with cognitive disabilities, like Elena and Daniele. Unfortunately, this is often a forgotten group because of ignorance and fear in society. Taking online courses is an important option for all students. As we will see, at the same time an online course can be difficult for students with disabilities; it also has advantages. Access to online instruction needs to be made available to students with cognitive disabilities just as it is for students with learning, mobility, PTSD, and traumatic brain injury disorders. The fundamental question, then, of this paper is “what can be done to improve access, retention, and success for the 14% of postsecondary students with cognitive impairments taking online classes?” Targeting specific types of impairments are not an efficient option, given that even the same kinds of impairments often present themselves in different ways. Rather, this paper develops a conceptual framework around work done by the Center of Applied Special Technology in the application of recognition, strategic, and affective brain networks to improve instruction related to cognitive impairments including attention and memory, language, executive function, problem solving, and social interaction. Additionally, I recommend turning the locus of support for students with cognitive impairments 180°, addressing support for students at the instructional level instead of the institutional level, which usually takes the learner out of the classroom. This has the negative effect of making the students feel as if they are not part of the class, and it delays support until the disabilities office has time to help the learners. This just-in-time approach based on instructional strategies personalizes instruction, minimizes frustration, and encourages persistence—leading to better learning and success. [Caveat: Statistics and the nature of the problems here describe the situation in the United States of America and are not meant to make assumptions of the postsecondary situation in Western Europe.]

Keywords: cognitive impairments; online education, universal design for learning

1. The situation

Elena is an online student who has a psychiatric disability: bipolar (manic/depressive) disorder. Daniele, another student, suffers from depression. As they begin an online class, they open the Learning Management System (LMS) and its one-size-fits-all screen wanting to read the syllabus and understand the course goals. They see 16 navigation buttons on the left side representing units of the class and another seven tabs across at the top representing different functions of the LMS. The center of the screen is filled with single-spaced text flowing from one side to the other. The text includes a variety of introductory information, assignments, detailed instructions, syllabus, information about the instructor, and course expectations. In other words, it's packed. A screen packed with information is intimidating for anyone; for a person with cognitive impairments it is overwhelming. Though Elena and Daniele have a different mental illness, the symptoms manifest themselves in similar ways. They quickly become bewildered and frustrated by the stimuli on the screen. When they check out the discussion forums, a feeling of panic begins. They find them hard to follow. The forum posts seem to grow geometrically each day. In a class of 20, in only a few days the posts number over 200. They find themselves falling behind. Unlike campus classes, there is no help available to solve the riddle of online instruction. After a couple of weeks, they drop out, as many with cognitive impairments do, as reported by disabilities offices around the USA (Carlton, 2004, Ito, 2004, Silva, 2004, University of Colorado at Denver Disabilities Office, 2004).

2. Introduction

Unfortunately, Elena and Daniele represent a large group of students for whom little is done to improve educational access to online learning environments. Though the focus of this article is on psychiatric disabilities, postsecondary institutions in the USA are finding increasingly diverse students including English as second language; physical (sight, hearing, and mobility), learning, and psychiatric

disabilities; and multiple representations of races, ethnicity, and religions. This diversity has caught administrators and faculty by surprise.

Traditionally and historically, postsecondary faculty has treated all students in the same way because “normal” students attend school and the troubled do not. Thus, students are caught in long tradition of postsecondary teaching—lectures relying on verbal media of voice and text (Oblinger, 2004) leaving diverse students on their own to adapt to the course (Tollefson, 2003).

Relying solely on verbal methodologies is unnecessary today. Digital innovations and applications offer opportunities to go beyond both passing-on information and the cumbersome learning management systems to offer greater differentiation to diverse students. Web 2.0 applications offer increasingly flexible learning options that students use everyday, including Twitter, Flickr, Facebook, Blogs, YouTube, ning, zulu, multimedia, research aggregators, RSS, and on and on. With this growing flexibility, it’s possible to improve learning accessibility for all students, not just those with disabilities.

The specific aims in this article are twofold:

- to bring to the forefront the problems that students with mental illness may have and to describe the scope of the problem;
- to provide a construct to guide the development of more flexible teaching methodologies within universal design for learning;

3. The nature of the problem

One of the first problems students with disabilities encounter is finding support. In on-campus classes, students find support at disabilities offices including tutors, note takers, extra time, and so on. However, these offices are ill equipped for distant learners. First, on-site services are often not available to online learners, who may be far from campus or unable to go to campus. Second, obtaining support means that students with cognitive disabilities must disclose their illness—something that most students are loath to do (Bushnell *et al.*, 2005).

The crux of my argument turns the traditional accommodation strategy for students with special needs 180°. Accommodations for those with disabilities must be located within the instructional strategies rather than placing on students the onus of finding support outside of the class environment. Instruction can and should be designed to be flexible enough to support the range of diverse learners — not just the *typical* student. In fact, there is no *typical* student—it is not a question of polar opposites—normal vs. not normal. Rather it is a continuum with all students needing or preferring different kinds of instruction. Thus, more accessible instruction helps all learners, not just those with disabilities.

3.1 Extent of need: growing number of learners with cognitive disabilities

Students with psychiatric disabilities represent a growing number of students in postsecondary education. The National Alliance for the Mentally Ill (2004) found that up to 27% of postsecondary students between the ages of 18 and 24 struggles with some kind of mental illnesses including depression, ADD, schizophrenia, post traumatic stress and bipolar disorders at some point in their school lives. As more veterans from Iraq return home and seek education, dealing with PTSD and traumatic brain injury become a significant issue. HealthyPlace.com (2002) found that counseling centers reported an increase of 56% from 1988 in the number of students with severe psychological problems. In fact, surveys of several university disabilities offices around the nation (Blalock, 2004, Carlton, 2004, Ito, 2004, Leake, 2004, McCandless, 2005, McGill, 2004, Silva, 2004) report the growth rate of students seeking help for psychiatric disabilities from 10% to 50%, led by bipolar disorder.

3.2 Growth of online learning

The problem of helping students like Elena and Daniele is made more urgent by the growth of online education. Allen and Seaman (2005) report that 65% of institutions offering face-to-face graduate courses report an 18% growth rate from 2004 to 2005 at the graduate level and 33% at the baccalaureate level. The CU Online office at the University of Colorado reports a 24% in the number

of students wanting online classes *between the end of the spring semester 2009 and the beginning of the summer semester* (Tolsma, 2009).

Taking online classes is an important option. First, online courses may be the only way to take a class not offered at an institution because of distance. Second, local institutions may offer limited program options in their interest area or infrequent course offerings. Third, work schedules, job location, and family commitments compete with class times. Fourth, students with disabilities may be more comfortable working at home where they have time to make thoughtful responses in discussion forums or e-mails to faculty or other students. Finally, it may be the only way students with mobility disabilities can take classes.

While growing in sophistication, existing online course platforms and instructional design strategies do not address problems of learners with cognitive impairments. The lack of appropriate interface flexibility, a narrow choice of instructional design strategies and specific information about how to address the needs of students with cognitive impairments limits educational opportunities for this population of students. The next section and Table 1 identifies the major kinds of cognitive impairments affecting learning.

[NOTE: Table 1 is integral to the text and elaborates on information not in the body of the paper. For that reason, it is placed at the end of the paper after the conclusions. It shows the relationships between cognitive impairments, universal design for learning, and the use of brain research to provide an integrated conceptual framework for helping learners with disabilities. The table has two main components: first, it categorizes examples of cognitive impairments affecting several kinds of learning processes; second, it suggests instructional methodologies to help teachers create more accessible instruction. The table is a compilation of a variety of sources (Martinez-Aran *et al.*, 2000, Martinez-Aran *et al.*, 2004a, Martinez-Aran *et al.*, 2004b, MS Information Sourcebook, 2003, Scientific Brain Training, 2004, Zarate *et al.*, 2000, Zemke and Zemke, 1984, Zull, 2002).]

4. Cognitive impairments

There are many types of psychiatric disabilities including anxiety disorders (e.g., phobias, panic disorders, and obsessive-compulsive), mood disorders (e.g., depression, manic-depression, personality, and PTSD), traumatic brain injury, and schizophrenia as the most common causes. Psychiatric disabilities manifest themselves through cognitive impairments that affect the range of learning processes including attention and memory, language, executive function, problem solving, and social interaction. Impairments may be temporary, recur episodically, or be life long (Marano, 2002). Not only do diseases and trauma cause impairments, but also the treatments can cause additional kinds of impairments that affect learning.

4.1 Cognitive impairments: attention and memory

Problems with attention affect perception, concentration, regulation of emotion, and memory. Memory is critical to all other cognitive activities. Short-term memory retrieves words, ideas, general knowledge, prior experience, and procedures. Impairments include problems with recalling and integrating new knowledge and experience and to old memories and knowledge. (See column 1 in Table 1.)

4.2 Cognitive impairments: language

With language, learners communicate with others and themselves through the processes of speech, writing, listening, and signing. Impairments include failure to find the right words, aurally processing of logical arguments, conducting the self-reflection and self-assessment, and difficulty in expressing ideas in synchronous and asynchronous environments. (See column 1 in Table 1.)

4.3 Cognitive impairments: Executive function

Executive function includes the ability to make plans, carry them out, change strategies, and engage met cognitive skills. Impairments affect managing and organizing time, thoughts and action, monitoring progress, and selecting and changing strategies. (See column 1 in Table 1.)

4.4 Cognitive impairments: Problem solving and reasoning

Problem solving and reasoning are complex behaviors including strategizing, critical thinking, hypothetical-deductive reasoning, synthesizing, and giving and receiving feedback. Impairments include the inability to plan a process using appropriate strategies, sequence steps, change direction, and finding relevant sources. (See column 1 in Table 1.)

4.5 Cognitive impairments: Social function

Functioning well with others affects social, education, and work environments, a complex problem because it involves interactions with others. Most course platforms provide email, chat, and forums as the primary means of instruction. All are written forms of text and none show body language or voice inflection. Students with psychiatric disabilities tend to easily misinterpret meanings; they may be prone to defensiveness, see criticism where there is none, miss subtle attempts at humor, and react angrily or despairingly. (See column 1 in Table 1.)

5. Universal design for learning

The range and multitude of cognitive impairments indicate the complexity of this problem. It is even more confounding when we realize that not every individual presents every symptom, symptoms vary in intensity within individuals and within time frames, and an individual may have two or more disorders confounding the issue. It seems an impossible task to take on each symptom as a unique instructional problem to solve; or to take each individual with his or her unique set of symptoms and try to design instruction for each. *Universal Design for Learning* (UDL) provides a framework to approach the problem of designing accessible for learners with cognitive impairments. Interestingly, universal design comes from the field of architecture. Countries are trying to increase accessibility to buildings for those with disabilities; however, these changes benefit everyone. For example, curb cuts for wheel chairs make it easier for baby strollers and bikes; lever door handles rather than knobs make it easier when carrying packages; larger print on elevators make it easier for the baby boomer's failing sight. Everyone benefits. The same holds true in the field of education. The Center for Applied Special Technology (Center for Applied Special Technology, 2009a) defines Universal Design for Learning (UDL)

“as a framework that can help you turn the challenges posed by high standards and increasing learner diversity into opportunities to maximize learning for every student”.

The underlying premise is that students fall along a continuum of learner differences (see Figure 1). Rather than requiring students to go elsewhere for assistance, UDL promotes the use of digital tools within instruction to improve differentiation. Figure 1 represents a number of kinds learning differences that may affect how a professor designs his or her instruction, either onsite or online.



Figure 1: Continuum representing individual differences 5.1 UDL and brain

6. Research and digital tools

Another aspect of CAST is their leadership in the application of recent brain research to provide a framework for organizing recommendations to deal with differentiation ((Center for Applied Special Technology, 2003, Center for Applied Special Technology, 2009b, Center for Applied Special Technology, 2009c, Center for Applied Special Technology, 2009d, Center for Applied Special Technology, 2009e). This framework focuses on three brain networks: recognition, strategic, and

ffective broadly covering the instructional process (see columns 2, 3, and 4 in Table 1). Learners use the *recognition network* to identify information including names, facts, numbers, etc. The recognition networks answer the questions “who, what, when where”? Students ask questions, such as: what are we learning? What information do I need? What does the term “x” mean? This helps learners relate new knowledge to prior memories, knowledge, and experience. Learners use the *strategic network* to plan, to determine how they will learn, to solve problems, to select, use, and modify learning strategies. We learn things for a reason and that reason leads to action. We use the information that we recognize to plan an action such as taking a test, writing a paper, creating a video, or solving a problem. Finally, we engage in metacognition to monitor and reflect on learning strategies and progress. Learners use the *ffective network* to engage in learning. They have emotional reactions to content, strategies, and assignments. They want the subject to relate to their lives. They have different learning styles, ways to study, and learning activities. The goal is to utilize the range of learner strengths (remember the continuum in Figure 1). These three networks provide a means for developing strategies to create more accessible instruction (see columns 2, 3, and 4 in Table 1). A critical component in Cast’s construct is the use of a variety of digital tools. First, there are well-known tools to facilitate physical accessibility including text readers, large print formatters, handless control devices, and voice recognition software. Second, there is the growing number of new web-based and social learning—often Web 2.0 applications (see Table 2 for a list of just a few available tools). Meeting the needs of an increasingly variety of learners would not be possible without digital tools. Some of the applications and functions include:

Table 2: Examples of some more recent Web 2.0 tools (as of May 2009)

<i>Application</i>	<i>Description</i>	Sc	P	M	R	Pr
notely.com	gateway to find task management tools					x
screencast-o-matic.com	organization tool					x
voicethread.com	collaboration media posting, and discussion tool	x	x	x		
surveymonkey.com zoomerang.com	free survey tools					x
evernote.com	screen and media capture tool			x		
netvibes.com	media podcast, blog, email, etc.	x	x	x		
slideshare.com flickr.com	image collection and resources			x	x	
delicious.com	social bookmarking and reference tool	x			x	
twitter.com	social networking tool	x				
zoho.com	19 productivity tools	x	x	x	x	x
ning.com	social networking tool	x				
jingnoodletools.wikispaces.com	screen capture and collaboration tool	x	x	x		
noodletools.com	bibliography tools					x
moodle.com	open source learning management system					x
flowgram.com	multimedia interactive presentation		x	x		
fraps.com	real time video capture		x	x		
voicethread.com	share images, documents, pod and video casts	x	x	x		
wiggio.com	collaboration, calendar, emails, polls	x				x
sketchup.google.com	free 3D and CAD tool					x
coveritlive.com	live collaboration	x				
nichsoftware.com	video capture software			x		
RSS feeds	research and collaborative tool	x			x	
www.bubbl.us	online brainstorming tool	x				x
audacity.sourceforge.net	audio/podcast recording		x	x		
googledocs.com	collaborative project/document creation	x				x
googlegroups.com	collaborative tool	x	x			
googletalk.com	online chat/text tool	x			x	x
jing.com	screen/vidcasts/screen capture sharing tool					
polleverywhere.com	instant polling/answer results	x				x

Sc = Social learning and networking and collaboration

P = Presentation Tools

M = Multimedia Tools

R = Research Tools

Pr = Productivity

- *Communication and social learning tools.* Digital applications and technology make it possible to communicate in multiple ways such as asynchronous (forums, email, groups), synchronous (chat, telephone), blogs, multimedia podcasting, group software, email etc.
- *Multiple examples.* Teachers and students can provide multiple examples for learning, metacognition, and teaching such as Flickr, YouTube, Twitter, Facebook, blogs, building presentations, wikis, etc.
- *Scaffolding* can include anything from examples to step-by-step processes including examples of problem-solving processes, step-by-step forms to help one focus, project management software (eProject.com), RSS applications (bloglines.com), planning techniques, timelines, online library access, cognitive modeling software (neuromod.org), etc.
- *Self-expression.* Provide multiple ways of self-expression such as blogs, PowerPoints, slide shows, Wikis, synchronous chat, web design (Macintosh life is great for this), MySpace, Flickr, iTunesScholar, PDAs, pod- and videocasting, etc.

7. Conclusion

This paper has three aims:

- to bring to the forefront the problem of mental illness, psychiatric disabilities, and cognitive impairments in postsecondary education. Cognitive impairments from psychiatric and traumatic causes affect a large number of postsecondary students. In looking at the overall scope of diversity, we can see that the “normal” student does not exist and that there are many reasons for improving the accessibility of instruction.
- to provide a construct to begin to develop greater differentiation necessary to meet the needs of students—to make designing for a diverse populations possible and manageable. It isn’t something that can be done all at once, but in stages and in bits and pieces. Helping faculty meet these needs is going to take concerted efforts at professional development.
- To begin to bring the use of Web 2.0 tools into the mix for teaching and learning. Digital innovations offer us an opportunity to go beyond cumbersome learning management systems and offer more differentiation. The Web 2.0 world is changing so fast that keeping up with the new opportunities takes constant attention. By the time this paper is published, there will be a thousand new applications, but it is a beginning.

As you can see, this isn’t all about online instruction, it’s about growth in a faculty’s ability to teach and help all students—to increase instructional accessibility for students like Elena and Daniele. The next article is to take specific internet applications and relate them to specific strategies to develop professional development strategies.

Table 1: Cognitive impairments, symptoms, and UDL strategies

1. Attention and Memory Symptoms	Recognition Network	Strategic Network	Affective Network
Inability to divide attention among tasks Trouble focusing on multiple steps Regulating emotional responses to stimuli and challenges Lack of mental alertness caused by the disease or medications Difficulty in relating new situation with past experience	Multiple examples to use prior knowledge Multiple versions of content using video, slide shows, pdfs, animation, audio etc. Graphic organizers and headings to separate content items to focus attention and avoid over stimulation Predetermined paths through information Small chunks to maintain attention and reduce anxiety.	Models of skilled performance and processes Make expectations clear and provide exemplars Narrated pod and vidcasts to show project steps and to clarify assignments Critical thinking questions and sample answers Time estimates for completing tasks.	Activity choices within the units to enhance buy-in Know students’ interests Variety of content to appeal to multiple interests Assignments encouraging multimedia to encourage expression and relevance
2. Language Symptoms	Recognition Network	Strategic Network	Affective Network
Inability to find the right words Lack of ability to write or follow a logical argument Poor processing of sentences	Multiple media formats to enhance decoding of material: Text-to-speech	Templates to structure activities Clear steps to help students work in a	Avoid over stimulation and give plenty of scaffolding: Time for students to

Inability to organize and express thoughts and ideas through several modalities (e.g., lexical, syntactic, gesture)	Voice recognition Text outlines Multimedia Support text readers Write captions for embedded media.	logical order Rubrics to help students self-assess work Cooperative learning Multiple symbol systems: graphics, video, audio, writing, etc. Time for processing with asynchronous communication tools, wikis, blogs, etc.	formulate thoughts and words Promote teamwork through the use of group-based applications Asynchronous communication to reduce anxiety
3. Executive Function Symptoms	Recognition Network	Strategic Network	Affective Network
Difficulty setting goals, planning, and beginning Lack of flexibility shifting strategies and tasks Difficulty in monitoring progress for pace and quality Fails to anticipate problems Does not relate past experience Does not engage in self-reflection Low tolerance for failure or frustration, quits easily	Background knowledge Web links to information already learned Link students to experts Multimedia glossary including text, multimedia, and links to other sources Ask students to explicitly state the relationship of the new knowledge to past knowledge and experience Use blogs to ask for writing about relevance of new projects	Forms to ask students to build goals and devise plans Ask students to think about their goals and compare to exemplars or other students Ask for plans and timelines using project management software Periodically ask about progress and strategies used Use podcasts to explain processes	Communicate frequently via personal email to reduce stress and encourage thinking Gradually increase levels of difficulty Give selection of projects Encourage alternative plans from the beginning Show different examples for solving problems Use flexible, collaborative work groups
4. Problem Solving and Reasoning Symptoms	Recognition Network Use . . .	Strategic Network Use ..	Affective Network Use .
Difficulty analyzing problems and recognizing steps Inability selecting most appropriate strategy with a problem step May continue to use ineffective strategies Have very low tolerance for failure or frustration Tend to locate the source of their troubles outside their control	Highlight critical features of content with color and graphic organizers Use different kinds of presentation software (word processing, pdf, PowerPoint, concept maps) offering different modes of presentations Limit quantity of information presented on one screen Organize definitions into glossaries	Ask students to stop and rate progress frequently Provide examples of learning strategies and when they are used, Suggest specific strategies for an assignment Provide examples of problem-solving steps Keep problem solving process steps small Provide examples of alternate strategies	See items under "Executive Function"
5. Social Function Symptoms	Recognition Network Use . . .	Strategic Network Use . . .	Affective Network Use . .
Inappropriate reaction to a situation or messages Difficulty in shifting perspectives and seeing another's point of view Failure to recognize or to take into account feelings of others Judge their behavior on the	Organize discussion forums around single topics Limit number and length of contributions Break discussions into smaller teams to help people get to know	Asynchronous communication to give chances to think before response Encourage use of blogs to ask questions and test	Help students handle stress and anxiety through frequent personal contact Work with teams to discuss process Ensure that students know that

approval Overly sensitive to criticism of others Low self-esteem and fear of betrayal	each other Present instructions in multiple formats	ideas in another forum Ask students to argue ideas from different points of view to develop flexibility of thought	accommodations are available Set rules of etiquette; avoid flaming and inappropriate posts and messages Encourage conversations about things other than class, and the posting of personal pictures and information
---	--	---	---

In General:

- Examples can help students understand what is necessary when planning. To encourage metacognition includes examples of prior work demonstrating self-talk analysis of planning procedures. Built-in and live feedback encourages students.
- Instructional methodologies should focus on multiple versions of content presentation with a variety of multimedia, highly structured directions, and open, well organized screens.
- Strategies should focus on multimedia presentation options, structured communication systems, examples of self-talk, asynchronous communications, and use of databases. Oral language is fleeting; it should be accompanied by scripts. Blogs encourage self-expression. Careful structuring of discussion forums can make it easier to follow threads.
- Facilitating executive function requires a great deal of scaffolding to support planning and time management, including multimedia examples and frequent “live” and “built-in” feedback through communication and examples.
- Strategies to support problem solving and executive function are closely related including scaffolding to help learners analyze, select, and change approaches. Step-by-step work sheets and forms can help guide the process. Synchronous communication such as “chat” can provide encouragement and feedback. Multiple forms of expression through slide shows (PowerPoint or Flickr), video, and graphics give student multiple ways of thinking about a problem.
- Giving time in the first week and in subsequent weeks to form relationships and learn about each other is critical. Strategies should help learners schedule communication, promote analysis of different view points, personal expression through blogs, and how to analyze messages and posts without reacting inappropriately. Efforts should be made to ask students to use visual and aural media.

References

Allen, I.E. and Seaman, J., 2005. Growing by degrees: Online education in the united states, 2005.

Bialock, B., 2004. Disabilities office functions: University of Minnesota. Denver: UCDHSC.

Bushnell, J., Mcleod, D., Dowell, A., Salmond, C., Ramage, S., Collings, S., Ellis, P., Kljakovic, M. and Mcbain, L., 2005. Do patients want to disclose psychological problems to gps? Family Practice, 22, 631-637.

Carlton, P., 2004. Disabilities offices functions: Ohio State University. In S. Grabinger (ed.) Denver: University of Colorado Denver.

Center for Applied Special Technology, 2003. Underlying premises for universal design for learning [online]. Center for Applied Special Technology. Available from: <http://www.cast.org/udl/index.cfm?i=7> [Accessed Access Date 2004].

Center for Applied Special Technology, 2009a. Cast mission statement [online]. Center for Applied Special Technology. Available from: <http://www.cast.org/about/Mission,VisionandPeople231.cfm> [Accessed Access Date 2009].

Center for Applied Special Technology, 2009b. Differentiated instruction and implications for udl implementation [online]. Center for Applied Special Technology. Available from: <http://www.cast.org/publications/UDLguidelines/version1.html> [Accessed Access Date 2009].

Center for Applied Special Technology, 2009c. Differentiated instruction and implications for udl implementation [online]. Center for Applied Special Technology. Available from: http://www.cast.org/publications/ncac/ncac_diffinstructudl.html [Accessed Access Date 2009].

Center for Applied Special Technology, 2009d. Universal design for learning [online]. Center for Applied Special Technology. Available from: <http://www.cast.org/teachingeverystudent/> [Accessed Access Date 2004].

Center for Applied Special Technology, 2009e. Universal design for learning (udl) guidelines [online]. Center for Applied Special Technology. Available from: <http://www.cast.org/research/udl/> [Accessed Access Date 2009].

- Healthplace.Com Depression Community, 2002. On campus: The doctors are 'in' [online]. Healthplace.com. Available from: <http://www.healthplace.com/depression/children/on-campus-the-doctors-are-in/menu-id-68/> [Accessed Access Date 2009].
- Ito, A., 2004. Disabilities offices functions: University of Hawaii. In S. Grabinger (ed.) Denver: University of Colorado Denver.
- Leake, D., 2004. Disabilities offices functions: University of Hawaii. In S. Grabinger (ed.) Denver: University of Colorado Denver.
- Marano, H.E., 2002. How to survive bipolar [online]. Psychology Today. Available from: <http://www.psychologytoday.com/rss/pto-20030806-000010.html> [Accessed Access Date 2009].
- Martinez-Aran, A., Vieta, E., Colom, F., M., R., A., B., C., G. and M., S., 2000. Cognitive dysfunctions in bipolar: Evidence of neuropsychological disturbances. *Psychotherapy Psychosomatics*, 69, 2-18.
- Martinez-Aran, A., Vieta, E., Colom, F., Torrent, C., Sanchez-Moreno, J., Reinares, M., Benabarre, A., Golkolea, J.M., Bruguè, E., Dabon, C. and Salameo, M., 2004a. Cognitive impairment in euthymic bipolar patients: Implications for clinical and functional outcome. *Bipolar Disorders*, 6, 224-232.
- Martinez-Aran, A., Vieta, E., Reinares, M., Colom, F., Torrent, C., Sanchez-Moreno, J., Goikolea, J.M., Comes, M. and Salameo, M., 2004b. Cognitive function across manic or hypomanic, depressed, and euthymic states in bipolar. *American Journal of Psychiatry*, 161, 262-270.
- Mccandless, M., 2005. Disabilities services office services at University of Denver. In S. Grabinger (ed.) Denver.
- Mcgill, L., 2004. Disabilities office functions: University of Colorado Denver. In S. Grabinger (ed.) Denver: University of Colorado Denver.
- Ms Information Sourcebook, 2003. Cognitive function.
- Oblinger, D., 2004. Boomers & gen-xers millennials: Understanding the new students [online]. [Accessed Access Date 2005].
- Scientific Brain Training, 2004. About the brain [online]. http://www.happyneuron.com/gbhappyneuron/information/corpus/saga/fct_cogni.asp [Accessed Access Date 2004].
- Silva, J., 2004. Disabilities offices functions: University of California -- Davis. In S. Grabinger (ed.) Denver: University of Colorado Denver.
- Tollefson, J., 2003. Putting the special in special education [online]. kuCRL.org. Available from: <http://www.kucrl.org/library/misc/zigmond.shtml> [Accessed Access Date 2005].
- Tolsma, R., 2009. Growing use of online instruction at the University of Colorado. In S. Grabinger (ed.) Denver. University of Colorado at Denver Disabilities Office, 2004. Discussion on make up of student population seeking assistance. Denver.
- Zarate, C.A., Jr. M.D., Tohen, M., M.D. Dr. P.H., Land, M., B.S. and Cavanagh, S., B.S., 2000. Functional impairment and cognition in bipolar. *Psychiatric Quarterly*, 71, 309-329.
- Zemke, R. and Zemke, S., 1984. 30 things we know for sure about adult learning. *Innovation Abstracts*, VI.
- Zull, J.E., 2002. *The art of changing the brain: Enriching teaching by exploring the biology of learning* Sterling, VA: Stylus Publication

