Reseña de Tecnología para Asistencia Multimedia: Acondicionamientos Universales para Estudiantes con Necesidades Especiales

Survey of Multi-Media Assistive Technology as Universal Accommodations for Students with Special Needs

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Resumen

El Acta para los Estadounidenses con Discapacidades de 1990 requiere que los estudiantes con necesidades especiales reciban 'acondicionamientos académicos, modificaciones razonables, y ayuda y servicios auxiliares'. Este trabajo apoya la idea de acondicionamientos universales, que involucra técnicas de enseñanza que fomentan el aprendizaje sin disminuir la calidad académica. Se consideran distintos métodos de asistencia tecnológica multimedia (MAT) como las notas compartidas, clases en audio y transcripciones escritas. Utilizar estas herramientas mediante un soporte en línea ayuda a que los estudiantes se adapten a los contenidos, comprendan las ideas de manera efectiva y sean responsables de su propio aprendizaje. La implementación de estos recursos también permite reducir los estigmas de participación que se derivan de la aplicación de políticas para la discapacidad, al tiempo que crea oportunidades en la clase para todos los estudiantes. La muestra analizada permite concluir que dichos acondicionamientos MAT son empleados de manera voluntaria y resultan significativamente útiles.

Palabras clave: notas escritas por estudiantes; diversidad en la clase; transcripciones; grabaciones de audio; servicios para la discapacidad; acondicionamientos.

Abstract

The Americans with Disabilities Act of 1990 requires that students with special needs receive 'academic adjustments, reasonable modifications, and auxiliary aides and services'. This project supports universal accommodations, which are special assignments or teaching techniques that enhance student learning without lowering academic standards. Shared student-written notes, audio lectures, and written transcriptions of the lecture are the reported forms of multi-media assistive technology (MAT) that are considered in this study. Sharing these tools with students using an online medium helps college students adapt to the content in a healthy way, obtain ideas effectively, and take responsibility for their learning. Implementation of the proposed MAT resources can reduce reported negative reactions and stigmas of participation that come from enforcing policy on student disabilities, and create advantages in the classroom for all students. The current sample of college students report that MAT accommodations are significantly useful and are likely to use these resources voluntarily.

Key words: student-written notes; diversity in classroom; transcriptions; audio recording; disability services; accommodations.

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Introduction

Making online learning resources accessible to any student is economically realistic, as everyone may need accessible technology as the population grows older (Case & Davidson, 2011). Given increased admissions of students with special needs among postsecondary educational institutions, there has been a call for complete or universal accommodations with regard to course material. However, many universities have not mandated full accessibility. The researchers in the study survey students to consider their perceptions of the usefulness of learning accommodations. For the purposes of the universal accommodations learning model applied in this study, universal accommodations are referred to as Multi-Media Assistive Technology (MAT). All students, as opposed to a small percentage of students who have reported disabilities, have access to the MAT resources. The goal of the study is to provide universal accommodations that enhance the skills and opportunities of all students while simultaneously address some academic needs of students with reported academic disabilities.

Universal accommodations

Terzi (2005) describes the risk of labeling students as 'disabled' and refers to learning disabilities as 'special needs' as part of an innovative strategy to provide academic provisions. In accordance, this study explores a similar philosophy of education that reconceptualizes 'disability' in effort to overcome tension at the core of the dilemma of difference in the classroom (Dyson, 2001). The current study explores a universal set of multi-media-based accommodations that college instructors can use to support students with special academic needs. Studies show that many college students with special needs do not fully avail themselves of disability services, are not aware of the needs arising from their differences, or might not seek-out accommodations (Marshak, Van Wieren, Ferrell, Swiss, & Dugan, 2010). To tackle barriers such as "identity issues, desire to avoid negative social reactions, insufficient knowledge, or perceived quality of services," this study offers a method that ingrains the accommodations into the course design (p.151). Since, Section 504 of the Americans with Disabilities Act of 1990 requires appropriate academic adjustments, instructors should consider the various barriers experienced by students who possess special needs in the academic setting.

Universal accommodations are designed to assist all students enrolled in a course by offering reasonable learning tools that do not compromise the quality of the teaching and learning. Studies have shown that accommodations directly affect students' abilities to demonstrate subject matter proficiency (Ketterlin-Geller, Jamgochian, Nelson-Walker, & Geller, 2012). Thus, the current learning model is designed to help ameliorate some effects of personal characteristics that limit access to critical information or prevent demonstrations of students' true abilities (Ketterlin-Geller, Alonzo, Braun-Monegan, & Tindal, 2007). By adjusting the curriculum design to accommodate all students, the overall learning experience in the classroom has potential to mature. Moreover, universally designed instructional tools allow most students to explore the subject matter and discover freely, and provides opportunities for different forms of expression.

Purpose of the study

The purpose of this study is to demonstrate students' perceptions of universal accommodations, which included the usefulness of student-written notes, audio recorded lectures, and written transcriptions of class lectures. The MAT resources are comprehensive accommodations that provide greater accessibility of information in many formats and environments regardless of a student's learning style or abilities (Tandy & Meacham, 2009). This intersection of modern technology and learner-centered pedagogy is also a useful teaching model. These study findings can inform instructors and disability service providers of a useful model that better serves students and also maximizes talents and potential of the general student population.

In summary, the universal accommodations learning model has enriched learning experiences for most participants in this study (including a small population of students with special needs). Comprehensive, shared classroom notes encouraged a more complete student-centered understanding of the course material. The audio lectures enhanced the online learning environment but also increased the significance of class lecture material for the overall learning experience. Lastly, full transcriptions of class lectures served as a valuable tool for reviewing course material, reiterating instructions, and documenting fine details.

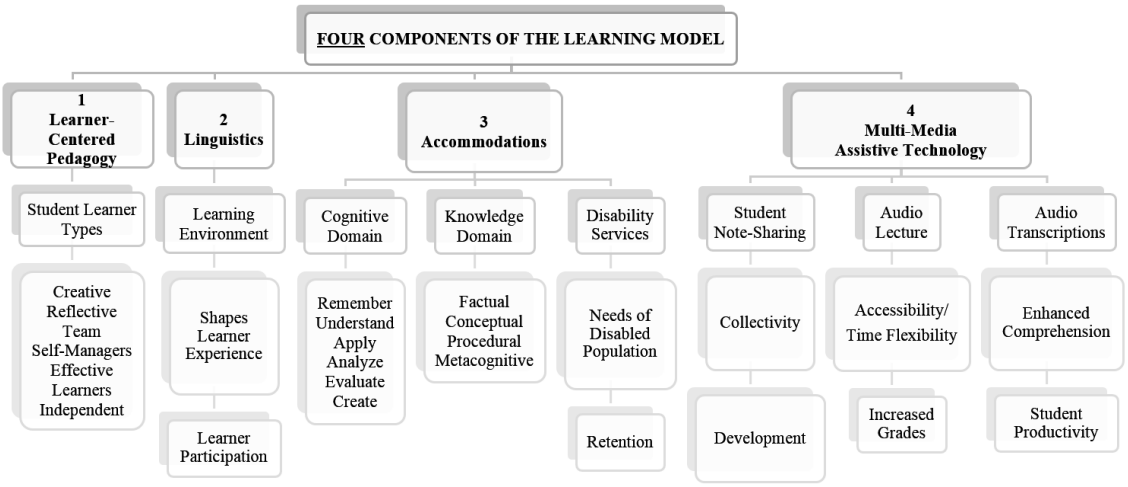

Figure 1. FOUR Components of the Universal Accommodations Learning Model

The universal accommodations learning model

The universal accommodation learning model includes four intersecting components: (1) a learner-centered pedagogy, (2) linguistics, (3) accommodations, and (4) multi-media assistive technology (MAT).

Component 1: A *learner-centered pedagogy* enhances students' ability to learn. The instructor also analyzes student learning potential in the class environment, and produces actively designed lectures/ resources that pertain to all students enrolled in a class. The pedagogy spawns active communication during the lecture and encourages the instructor to stimulate student learning outcomes that are active, cooperative, and inductive. The pedagogy appeals to six learner types: creative thinkers, reflective

learners, team workers, self-managers, effective participator, and independent enquirers (Grout & Long, 2009). Creative thinkers imagine, create abstract ideas, and offer inventive connections to course material. Reflective thinkers invite new ideas that connect to their current knowledge. Team workers adapt well in various contexts. Self-managers show a strong commitment to learning. Effective participators actively engage issues that impact themselves and others. Independent enquirers usually recognize difference, process information, and evaluate investigations effectively. By considering these learner types, the learner-centered instructor encourages innovative teaching, proper execution of knowledge, and the continuous growth of students.

Component 2: *Linguistics* involves the structure of cultural and social language used in the course. In this model, the instructor considers the structure, acquisition, and use of language in the classroom. The instructor identifies varied approaches to understanding the language used in class, which creates a more relaxed atmosphere, greater understanding of course material, and lower student stress/anxiety. Linguistics enhances the focus on student comprehension of course materials, accessibility for self-paced learning, and equitable student participation (Shu-Chiao, 2012). The classroom ambiance entails mutual respect. The instructor connects content in ways that inspire learning, positive attitudes, and confidence. This model establishes an inclusive, effective environment for every student regardless of potentially impaired mobility, speech, or vision. As a result, students are likely to view the course positively.

Component 3: *Accommodations* include three core elements: cognitive domains (how students learn), knowledge domains (types of information delivered), and disability services (special needs of students and student retention). The model categorizes students' cognitive skills to manifest a greater variety of approaches to understanding course content. Students are expected to think critically by remembering, understanding, applying, analyzing, evaluating, and creating knowledge (Anderson & Krathwohl, 2001). Revised Blooms taxonomy is a theory first initiated in 1948 that classifies levels intellectual behavior using a hierarchy of thinking levels. The taxonomy assists teachers in designing performance tasks for students that increase comprehension and expand their problem solving skills (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956). The taxonomy is applied to embrace specific knowledge types and the cognitive, affective, and psychomotor learning skills of students. Using this model, most students are challenged to process course material in many different ways. Furthermore, disability services are extremely critical given that students with special needs are likely to represent over 10% of all postsecondary students (Case & Davidson, 2011); and, they are likely to have one or more special needs (Tandy & Meacham 2009). In addition, persons with visual impairments are least frequently served (Alper & Raharinirina, 2006). A relative objective of this model is to enhance cognitive/knowledge disadvantages that lead to drop outs or longer graduation timelines (Cook, Rumrill, & Tankersley, 2009).

Component 4: *Multi-Media Assistive Technology* (MAT) allows students to access their class resources using an online learning management system. A learning management system is a software application used by educational institutions for delivery of electronic educational technology or classroom teaching used by the administration for documentation, tracking, and reporting. For example, Blackboard, Sakai, and WebCT are online systems that allow students to access online

course content. MAT includes student-written notes, edited audio recordings of lectures, and written full-lecture transcriptions. MAT resources increase availability of course content and offers flexibility of time (Rashid & Elahi, 2012). MAT resources also aid low vision and second-language learners (Case & Davidson, 2011). The digital collaboration spawns critical thinking, productivity, recall, and student preparation (Wright, 2011). The model increases the standards of the course by increasing student responsibility and boosting, maintaining, and improving students' functional capabilities. It also enhances peer support across different learning styles (Clark, 2007). Overall, integration of MAT accommodations are likely to result in grade improvements (Van der Westhuizen, Richter, & Nel, 2010).

MAT Resources

In this study, participants had access to student-written notes, audio lectures, and access by request to written lecture transcriptions. Student note sharing is a form of collaborative learning. During the note-sharing process, the instructor encouraged the entire class to examine the notes while also promoting that each student construct their own conceptual understanding of the learning material (Miyake & Masukawa, 2013). The note-sharing system was designed as a universal accommodation that would supplement and use a collective system to link student perspectives. The scope of coverage in the student-written notes was comprehensive. The shared notes were written by a student enrolled in each class and were shared electronically with peers. The student note takers submitted notes to the instructor the evening following each class. The instructor edited the notes for clarity and consistent design prior to making them available to the other students. The notes were both e-mailed to each class and posted with other notes in the appropriate lesson on the class site (using the learning management system). The current note-sharing process is distinct from other models because only one student prepares notes (voluntarily or by request) and interacts with the instructor. The instructor shares unique note-taking strategies with the student and prepares the student for the task. By the end of the course, students commented about how their note-taking skills has improved. Students also began to cite content from the shared notes in their homework assignments alongside textbook information. Ultimately, students were able to externalize and reflect using this teacher/student collaborative note process.

Audio recordings were conducted during each class sections. The audio was edited by the instructor and uploaded into a YouTube movie format. The YouTube video format allowed students to use any mobile phone with internet access to access the lecture. YouTube has several features that are attractive to student learners: (1) students can bookmark or create playlists of their class lectures, (2) they can adjust the speed of the audio, and (3) they can opt to show closed caption script of the lecture. Participants had access to the video link via e-mail or online. Students had 24-hour access to audio recordings and could opt to listen as many times as they needed to comprehend the course lecture material. Students could use the audio lecture to update their class notes, assist with homework, reconnect with outside readings, and to better grasp portions of the lecture that they may have failed to comprehend during the class session.

The transcriptions were unedited scripts of each lecture including all student and instructor's comments, which made the transcripts more comprehensive than the edited audio lecture recordings. To produce each transcriptions, a student intern used a transcription software package to create transcription as a MS WORD document. Although some transcription software packages are available as free downloads, a software package was purchased to enhance the efficiency of the process. All students had access to transcriptions of class lectures but the instructor did not make them available on the class site. Students who were interested in having full access to written transcriptions of the course could request an electronic copy from the instructor via e-mail. The transcriptions were a special accommodation for any student interested in re-examining content from the full lecture.

Method

Instrument and Procedures

The universal accommodations learning model was implemented in three classes taught by one professor at a university: a general education core course, a required course for the major, and an elective course. To engage participants appropriately, work study students asked students enrolled in the three classes to volunteer to take the survey after class. There were 85 students enrolled but only 74 students were available/agreed to participate in this study. These participants evaluated MAT resources that were accessible either via an online class site, by computer, or using a mobile phone.

Each participant completed a *six-question* survey about the usefulness of MAT resources. The surveys did not require that students disclose their names. Although the survey was straightforward, it also did not ask students to identify themselves as disabled. A goal of the universal accommodations learning model was to provide an all-inclusive equal opportunity service. Thus, the identities of 8% of study population (6 of 85 students) who reported special needs to the university were kept confidential.

All participants reported their academic status (freshmen, sophomore, junior, or senior). The survey assessed frequency of use and student perceptions of how useful MAT resources were during their student learning experience: (1) students considered the usefulness of student-written notes, (2) their voluntary use of student shared notes, (3) usefulness of audio lectures, (4) their voluntary use of those audio lectures, and (5) usefulness of written transcriptions of lecture material.

Results

Of the 85 students enrolled in the three classes, a total of 74 surveys were returned (an 87% response rate). The size of the classes ranged from 25 to 34 students each. Freshmen students made up 31.1% (23 students) of the sample population; 14.9% (11 students) were sophomores, 28.4% (21 students) were juniors, and 25.7% (19 students) were of a senior status at the university.

Table 1: How Useful are Shared Class Notes?

Usefulness of notes		Academic Status				Total
		Freshmen	Sophomore	Junior	Senior	
Agree	Count	20	9	21	18	68
	% within Academic Status	90.9%	90.0%	100.0%	100.0%	95.8%
Disagree	Count	2	1	0	0	3
	% within Academic Status	9.1%	10.0%	0.0%	0.0%	4.2%
Total	Count	22	10	21	18	71
	% within Academic Status	100.0%	100.0%	100.0%	100.0%	100.0%

Table 2: How often do Students use Shared Notes?

Use of Shared Notes	Frequency	Percent	Valid Percent	Cumulative Percent
Very frequently	13	17.6	17.6	17.6
Frequently	16	21.6	21.6	39.2
Occasionally	27	36.5	36.5	75.7
Never	10	13.5	13.5	89.2
Not applicable	8	10.8	10.8	100.0
Total	74	100.0	100.0	

Most students (68 individuals) agreed that student-written class notes were useful; 26% of those students agreed strongly. Upper class students were in full support of collaborative note-taking. Many participants reported using the student-written notes: 17.6% (13 students) very frequently, 21.6% (16 students) frequently, and 36.5% (27 students) occasionally. However, two freshmen and one sophomore participant did not find student-written notes to be a useful resource. Interestingly, 24.3% (18 students) believed the notes were useful, but did not use them. Unfortunately, 10.8% of students who did not use the shared notes reported limited or no access to the online notes outside of class time.

Table 3: How Useful are Audio Recordings of Class Lecture?

			Academic Status				Total
			Freshmen	Sophomore	Junior	Senior	
Usefulness of Audio	Agree	Count	22	9	17	19	67
		% within Academic Status	95.7%	81.8%	81.0%	100.0%	95.5%
	Disagree	Count	1	2	4	0	7
		% within Academic Status	4.3%	18.2%	19.0%	0.0%	9.5%
Total		Count	23	11	21	19	74
		% within Academic Status	100.0%	100.0%	100.0%	100.0%	100.0%

Table 4: How Often do Students Use Audio?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very frequently	1	1.4	1.4	1.4
	Frequently	14	18.9	18.9	20.3
	Occasionally	34	45.9	45.9	66.2
	Never	22	29.7	29.7	95.9
	Not applicable	3	4.1	4.1	100.0
	Total	74	100.0	100.0	

A vast majority of participants (90.5%) reported that audio lectures were useful. However, 33.8% (25 students) never listened to electronic lectures. Of the 66.2% (49 students) who listened to the audio lectures, 1.4% (1 student) listened very frequently, 18.9% (14 students) listened frequently, and 45.9% (34 students) listened occasionally. In line with other students, most (81%) students with junior-year status agreed that audio lectures were useful. However, more junior-status students (19%) did not consider audio lectures as a useful accommodation.

Table 5: How Useful Would Written Transcriptions of Class Lectures Be?

			Academic Status				Total
			Freshmen	Sophomore	Junior	Senior	
Usefulness of transcriptions	Useful	Count	22	11	19	17	69
		% within Academic Status	95.7%	100.0%	90.5%	89.5%	93.2%
	Not useful	Count	1	0	2	2	5
		% within Academic Status	4.3%	0.0%	9.5%	10.5%	6.8%
Total		Count	23	11	21	19	74
		% within Academic Status	100.0%	100.0%	100.0%	100.0%	100.0%

Participants were highly in favor of having access to lecture transcriptions. 93.2% (69 of the 74 participants) believed use of, or access to written transcripts would be useful. Participants were asked if the transcriptions "would be useful" because these written transcripts of each full lecture were only available upon request. In line with the student notes, freshmen students were less likely than upper class students to show favor for the transcribed accommodations.

Overall, the three reported MAT accommodations enhanced class interaction and were a beneficial addition to each course. Given the supportive student responses, the undergraduate student researchers presented the findings at an academic conference. The findings and an overview of the study has also been displayed on a poster for other students and university faculty to view.

Barriers

The universal accommodations learning model required online access, institution funded online tools/software, and student and instructor technology skill development. Unfortunately, some

institutions lack equitable access to assistive technology due to high equipment cost, lack of funding, inadequate information, or limited ongoing faculty support. This study took place in a university setting that offered each class access to a learning management site and assistive devices. While these resources are available in some postsecondary support services settings, the technology is not available in others. Furthermore, in this study, the instructor, work study students, and researchers were willing to self-train and assist students who were not savvy internet users.

The current model also requires a faculty buy-in and use of a learner-centered pedagogy. Alongside faculty members who apply the learner-centered pedagogy, there is also a community of other instructors who do not support the pedagogy. MAT resources such as shared notes or audio recordings of the lectures are often considered as a free-rider processes where students opt to use notes rather than read or learn the course material. Faculty may also argue that audio recordings encourage students to skip classes which can impact class participation. Furthermore, some faculty may argue that implementing the model will be too time consuming given the magnitude of their other required duties.

The universal accommodations learning model mirrors other accommodations including those in job placement programs. Entry-level job readiness programs are known to disseminate additional printed materials to their staff to enhance their knowledge and to encourage a collaborative learning process (Burgstahler, 2001). Some faculty are unable to make the connection between current business and academic strategies. This model uses a similar strategy that is unique, but useful among the current generation of learners. While this study does not ignore or deny the presence of these barriers, we also believe the overall benefit to the entire class supersedes the validity of the aforementioned allegations about a smaller sample of students.

Future direction

The four component learning model offers a unique direction for offering universally designed accommodations in the classroom. The findings of this paper show that students support and are likely to use student-written notes, audio, and transcriptions as a learning tool. Faculty who are student-centered in their teaching practices can incorporate these tools as new teaching strategies or confirm the validity of incorporating them. As found by the instructor hosting this study, using accommodations consistently encourages flexible and sustainable changes in instruction. Similar tools and practices also make learning more accessible without singling out students with special needs (Harrison, 2006). By exploring this learning model, educators may consider that multiple ways of accomplishing a goal or skill does not diminish the quality or water down the learning experience. Moreover, if instructors cater to visual, tactile, and auditory needs of students, the teaching style may also encourage students' autonomy (Stockall, Dennis, & Miller, 2012). The study has been introduced to encourage faculty to think critically about misunderstandings of fundamental issues regarding accommodations and their willingness to adjust their course designs. These findings also echo a documented demand for faculty to incorporate educational tools that are more user friendly.

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