

## **Active Viewing: An Oxymoron in Video-Based Instruction?**

Understanding the Nature of Self-Regulation Behavior of Learners Using  
Variable Speed Playback in Digital Video-Based Instruction

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Abstract

This presentation will review an innovative study on “self-monitoring” behaviors and “Self-Regulated Learning” (SRL) while viewing media-based instruction. Of particular interest is how students use variable speed playback (VSP) abilities now available in their players. The research study aimed to understand what relationship (if any) did students perceive existed among their particular viewing habits, playback speed of video lectures, and their learning? Streaming media-based instruction continues to grow in volume and accessibility. Many inexpensive products on the market today help create and distribute educational and training presentations. Individual learners and instructional technologists should proceed knowledgeably when using VSP functionality.

Statement of the Problem

Variable Speed Playback (VSP) functionality, or a user’s ability to dynamically control the playback speed of multimedia presentations, was previously available only through specialized software or hardware. Today, however, this ability to control the playback speed of digitized audio and video is available to learners on two of the three largest media players on the market. Learners can now more easily adjust and listen to audio/video-based instruction at self-selected speeds, regardless of whether the instructor, designers, or developers ever intended the materials to be accelerated. This is neither inherently advantageous nor problematic for optimal learning, but research suggests that above certain speeds, comprehension dramatically falls off for most people. On the other hand, users able to moderately accelerate presentations have reported increased attentiveness and comprehension. From an instructional design and development perspective, it would be helpful to understand the motivations behind learner’s use of VSP, and how learners might be using VSP as a tool to regulate their attentiveness and comprehension or, unwittingly be using VSP to inhibit their learning. This study seeks to better understand the nature of active viewing and self-regulated learning (SRL) practices of students using variable speed playback functionality in a digital video-based college course.

### Researcher Identity

To be sure, I am no “disinterested” or objective observer. My interest in this topic is personal. It springs from many of my own experiences and observations that I will describe in the following paragraphs. I was the chief designer of the software used to deliver the instruction some three years prior to this study. This study was, however, not a formative evaluation of the courseware, nor a summative effectiveness study; Instead, it hoped to focus on learner processes by examining the usage patterns, self-monitoring abilities and regulating practices/strategies of learners. Study participants were likely not affected by my having built their course materials—because this was not disclosed to them—but this is not to say that the research as a whole is unaffected. As the researcher, I found it difficult at times to stay out of the usability-testing mode, and remain focused on my primary research question. My focus, unlike in previous studies, and on other projects, was no longer looking for ways to improve the product or software, but rather to understand the learner. The differences remain subtle, and on one occasion I reflected on them in a journal entry as I traveled home from gathering my data:

I wish I knew then [in my software building days] about qual[itative] research, what I know now. It would've been so helpful...I guess while every usability tester should be a qualitative researcher, it may not go the other way around. I was worried that I might keep slipping into product eval[uation] mode, because it seems so close to what I've been doing the last few days...As long as I mentally focus more on my study questions of SRL [self-regulated learning] and the learner as I asked my questions, I'll be ok, and not think ahead about the programming necessitated to fix what they were complaining about.

### Description of the Problem

I have long held that instruction and learning can be both inhibited and promoted with the use of technology. Some of this is due to features of the technology itself, with other variables being dependant on the learner. That is, people's perceptions and attitudes towards technology can be equally inhibiting or facilitative to learning. In this semester-length accounting course, my participants were not required to come to class on a regular basis. They are provided with multimedia instructional materials on six CDROMs or one DVDROM. A course schedule, including regular

online quizzes, exists to help students manage their time, but by and large, students are expected to “personally activate and sustain behaviors, cognitions, and affects, which are systematically oriented toward the attainment of learning goals” (Schunk, 2004 p.355). According to Schunk, this is the process of self-regulated learning.

One technological innovation that I have worked with in the last few years is Variable Speed Playback (VSP) as applied to video-centric, multimedia presentations for instruction and learning. Today’s VSP technology allows one to speed up and slow down audio and video presentations without pitch distortions or the high speed “chipmunk” sound associated with accelerating audio cassettes and CDs—or reaching way back—our old vinyl records. It has recently experienced a resurgence in both availability and popularity and is included now by default in Microsoft’s Windows Media Player.

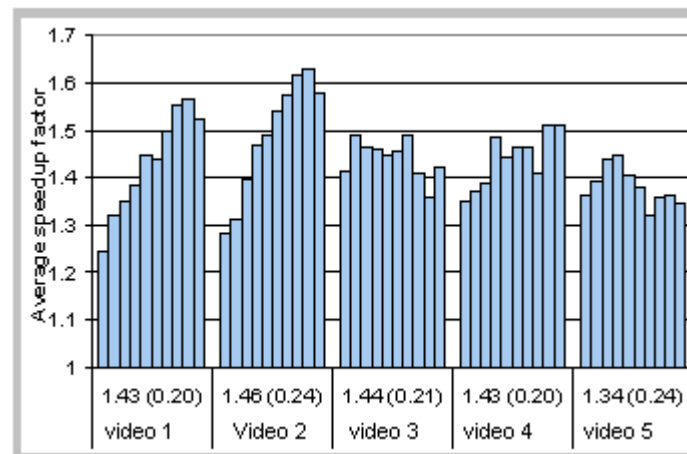
In my years as a professional non-linear video editor I learned the value of being able to swiftly navigate and view--“speed read”--vast amounts of media at high speeds while still being able to comprehend the content. In my more recent years as an instructional media designer/developer I built VSP functionality into a video-centric hypermedia course allowing students to dynamically control the playback rate or speed at which the instructional presentations (audio, video, graphics and animation) played. It is important to note that prior to introducing VSP to the multimedia course, student surveys indicated quite positive attitudes toward the course. Their single biggest frustration, however, was that the professor spoke too slowly and repeated himself too often. I recall some students asking--pleading--for a way to “speed him up”. As courseware developers, I and my team were personally all-too-aware of the student’s sentiment. We had just spent months listening to these materials, videotaping, digitizing, editing, programming, testing, revising, retesting the course materials and had listened to more than our share of the content! A solution to accelerate the hypermedia lectures would benefit the developers as much as the students.

We were capable and had considered accelerating the course videos by a fixed or pre-determined percentage, but how much should we speed things up? Was the effort worth a global

10% speed up? Would that hurt some learners? It was determined that accelerating the audio by a pre-determined percentage was not in the best interest of students, and that the solutions would have to allow learner control of the speed. A solution was identified (2xAV plugin from Enounce Inc.) that allowed learners to dynamically adjust the playback speed to suit their preference and it was immediately integrated midway through the school semester. Course feedback and positive ratings skyrocketed that semester—we were on to something! We had struck something valuable, but were not sure what; and did not fully understand its properties nor its effects.

As the designer, I was very pleased that since introducing VSP functionality, student frustration levels had subsided, and I hoped now that motivation and comprehension might also increase, and that students would use acceleration responsibly. I feared, however, that the positive response might have been simply due to the fact that they could “whip” through the material faster than before. I was left with questions as to when, where, how and why students might use VSP technologies to support and regulate their learning. In an earlier survey study following the integration of VSP into the accounting course (Galbraith & Spencer, 2001), students reported regularly accelerating through instructional presentations up to 2.5 times (2.5x) the normal playback speed over the course of a semester. At the same time, a few students choose to use no, or very little, acceleration. Their self-reported motivations for speeding through the material varied widely. Some responses clearly reflected use of VSP as a regulatory strategy to help maintain attentiveness and comprehension. Other student responses showed signs of regulatory practice, but not in support of learning—rather time management. As feared, some students appeared to be using VSP to make up for procrastination using the tool to simply skim through materials before a quiz deadline or to avoid missing a bus. In light of this information, and the rather high average speed reportedly used by students, I was concerned about whether students were sufficiently capable of self-monitoring and regulating their use of VSP to support their learning. Was the allure of “getting through” the material at a faster rate—even at the expense of learning--just too enticing? How was this tool being used, and what were students’ perceptions of its utility?

All the literature I had come across on accelerated audio focused primarily on listener comprehension of accelerated speech, or the effectiveness of various speech compression algorithms, but not the usage patterns--and certainly not couched in the context of self-regulated learning. I found one usability study published by Microsoft that evaluated such technology in a modified version of an early media player (Omoigui, He, Gupta, Grudin, & Sanocki, 1999). Like other studies, it did not assess learner intent and motivation--why users were motivated to adjust speeds? but it did record and report on how their viewers interacted with 5 video samples that varied in content and duration, over the period of a couple days of viewing.



**Figure 1--Chart from Orr et al. study (1999)**

Figure 1 shows how the researchers tracked average speeds of users for every 10% segment of the video. Of their observations, they noted, "...we clearly see that the subjects are watching them faster as they get deeper into the video. There is some slowdown right at the end, an area that corresponds to the concluding remarks" (Omoigui et al., 1999, p.5). I was generally impressed with their study and with the detailed observation data they were able to collect, but it was the last line about an implied, but not corroborated, connection between viewing habits and concluding or summary remarks that really stood out to me.

I knew that I wanted similar kinds of data to the Microsoft study. It would help us understand first *how*—and only thereafter, *why* users were interacting with course features the way

they did (specifically VSP functionality). Moreover, as the instructional designer, I desired to understand how conscious they were of their motivations and usage patterns, and what they did with that awareness. This study aimed at exploring these questions.

It is important to note that the VSP controller is not used in isolation. The slider used to adjust playback speed is integrated into an interface which numerous other media controls like play, stop, pause, “jump back 10 seconds” buttons, and a detailed hyperlinked index or “table of contents” that facilitates easy replaying of segments and skipping around in a given lesson . These other controls are important, because they play a cumulative role in how students use VSP. For example, I often observed students clicking the “jump back 10 seconds” button. During interviews they discussed using this button frequently if they were momentarily distracted by a room mate or a non-course related thought. Because they proceeded swiftly through the material, the “jump back 10” button was often used in tandem with acceleration.

Such insights were gained through lengthy observations and interviews with student participants. Their descriptive answers to the self-regulation behavior questions of this qualitative study, are critical for instructional designers and technologists designing video-centric course materials. In 1971, Gilbert Ryle first introduced the notion of “thick description” as a means of differentiating between what is really happening when the same action occurs under different circumstances. Clifford Geertz (1973) emphasized the importance of understanding intent and meaning behind events through rich multilayered descriptions. Interpreting individual self-regulated learning behaviors and software usage patterns is not easily accomplished through the surveys, and focus groups commonly used for gathering feedback in instructional development contexts. Survey methods usually fail to adequately describe the nuances between similar observed behaviors that have different underlying motivations.

I too was trying to understand the underlying student motivations to adjusting playback speed). My courseware design and development experience in higher education has illustrated to me how few college learners are skilled at self-monitoring, and how unaccustomed they are to “think

aloud” activities, and to analyzing their highly routinized behaviors and learning strategies for researchers. Thus, additional methods of gathering data--observing--are required--methods that help learners be more self-aware and better equipped to describe and critique the learning strategies they employ. This qualitative study employed a combination of research techniques to help participants more fully reflect on their VSP use experiences in relation to their learning.

In recent months I have gained a greater appreciation for the notion that not all learning and behavior is conscious. The exploratory use of Galvanic Skin Response (GSR) data in this study as a form of observation data was perhaps uncommon but not unprecedented in either educational or qualitative studies (see Clariana, 1990, 1992). Qualitative research in nursing and care-giving has long valued quantitative data such as heart rate, blood pressure and blood sugar in service of better understanding their patients and the quality of their health. In this study, quantitative GSR data was used to serve the qualitative process by providing talking points during the interviews. For the researcher, GSR observations can help make more covert, automatic and fleeting processes in the learner, more visible. For the learner, the GSR data was to help promote deeper reflection and self-monitoring. During interviews, it was hoped that a joint review of learner GSR data might trigger new awareness, or memory of previously subtle or forgotten thoughts and feelings regarding the participant’s regulatory habits vis-à-vis the interface and the content.

The ability to self-monitor and report one’s attentiveness and level of activation is a characteristic of a self-regulating learner (Pintrich, 1995). As early as 1907, Carl Jung claimed that “verbal responses do not tell all” and that electrodermal activity, such as GSR “revealed the secrets of mental life” (Stern et al, 2001 p. 206). Some research suggests that subjective reports of arousal, stress or anxiety seldom correspond with physiological measures (Glynn, Christenfeld & Gerin, 1999). Admittedly, GSR is anything but clearly interpreted. Nevertheless, it has had a relatively long, stable history and is a good measure of emotional response and some cognitive processes—more specifically, attention, arousal, anxiety and stress levels (Stern et al, 2001; Clariana, 1990,1992; Reeves et al., 1989; Schwartz & Shapiro, 1973). As GSR is reflective of a host of physiological and



emotional conditions the data alone is not useful to this study. Thus only in combining the data with my observations and subsequent collaborative interpretation with my participants, could the data be made useful and relevant. Unfortunately, it proved unwieldy and impractical given the technology and time available to me in this study, to discuss the GSR data with participants was therefore discontinued. I am convinced however that the process would be enlightening, and will pursue it again in future work.

### Gaining Access

The participants in this study came from a large and fairly unique introductory accounting course (Accounting 200) at Brigham Young University (BYU). I arranged access to the students through the instructor, with whom I had worked closely in the past to develop instructional tools. Importantly, the video-centric course employed the Variable Speed Playback (VSP) technology, which made it an ideal setting for my study. By way of reminder, unlike many large 200 level college courses, this course does not meet regularly in a classroom. Instead students study course materials on their own presented in the form of interactive multimedia lectures. The mode of instruction arguably requires a good deal more self-regulation than traditional face to face classes.

I chose not to disclose to students that I had been the designer of the software they were using. This was a conscious decision on my part because I did not want that information to unduly influence their conversations with me. I believe that most students simply perceived me as I had been introduced to them—a former alumnus of BYU, pursuing a Ph.D. at Penn State.

### Participants

Eleven participants were selected from among a host of volunteers. Volunteers responded to either an announcement made in class by their instructor, or to the same announcement posted on their course website. In volunteering, they were to indicate the following through email. 1) when they generally studied-what days, what time, what environment? and 2) How often they adjusted

speed controls (hardly ever, sometimes, a lot). I quickly received over 100 volunteers, and knew I could only ever deal with up to 10 participants. Generally, I attempted to get a variety of cases that would likely generate, to the fullest extent, as many diverse properties of the categories as possible (Glaser & Strauss, 1967 p.49).

When I had “down time” between scheduled observation/interviews, I ended up “trolling” the computer labs on campus for prospective participants. As the course enrolls over 1,200 students each semester, finding students in this manner presented no significant challenge. At any given time of day, the large labs I visited had at least two-six people working on the accounting course.

As an interesting side note, on March 31<sup>st</sup> I wrote in my journal:

Today (3/31/04) one Acc lab TA I talked to mentioned that I should contact evening TAs as it is they who deal with students who may have procrastinated trying to prepare for and take quizzes that are due by midnight (every Tuesday and Thursday night). Interestingly, it is those very students who might not have time to talk to me, and they would be an interesting group to include. I did not seek out people who were early birds, but sure seem to have found people that were staying well ahead of the game with the exception of only one I think.

As I noted in my journal, there was a group of students--procrastinators? whom I did not talk to, who might have been struggling with self-regulatory practices and whose perspective would certainly have added to this story, but were unfortunately not included. Ecological validity was important for me. That is, it was important for me to observe participants in the environments that they commonly used to study. Observations and interviews took place in student apartments, a home, an office and in various campus computer labs. In my journal, I recorded some of my thoughts on three of my participants whose names I have changed.

Dave was an interesting find. I overheard that he was an accounting major, and was surprised because of the amount of questions he asked of the acc TAs in the lab. He also seemed to be struggling with simple concepts. It was later when I approached him that I learned he was an accounting major. I also observed that he was viewing materials at 1.2 and 1.5x [comparatively slow]. Again, surprising since he was a major and should be getting this stuff. While speed use is no race, I was surprised to see a[n accounting] major proceeding so slowly and deliberately. It is good to see a tool that is so flexible, and can accommodate many different types of learners and their self-regulation practices.

Chris was also of particular interest to me. Chris is a handsome trendy-looking young man. I had run into his father on campus, an old casual acquaintance of mine. His father told me of how Chris was taking the class for the second time and that Chris was diagnosed as having

ADD--but was currently not taking any medication. Since failing is so hard to do in this class, [in my opinion] and since his ADD would be an interesting case in relation to self-regulation, I was interested in his story and arranged to observe and interview him at his home the next day.

Troy was anxious to talk to me. In response to my recruitment email, he said he had opinions on the course, and had taken many distance education and technology courses. I thought his perspective might be an interesting... for one, simply because he seemed so anxious to talk to me! I expected to get an earful!, and not necessarily about the topic of my research. Troy was a 40+- year old professional considering an executive MBA program. He seemed eager to continue his education, perhaps to secure a more stable life. Because I had followed a career path similar to his, and sought some stability for my family, perhaps I am projecting my rationale onto him. We'll see.

These were all interesting people to say the least, but I don't get the sense that these are extreme cases. Everyone in the class--all 1,200 of them--probably has equally interesting backgrounds and stories that bring them to this course. I felt extremely privileged to be let into my participants minds and their study time.

### Collecting Data

While this is a qualitative study, data collection on self-monitoring and self-regulation as well as on software usage habits is at its core, a largely phenomenological process--getting at the lived experience of learners involved in certain activities (Van Manen, 2001). The study's "groundedness" comes more from data analysis processes than from its data collection processes.

Data was collected through three main activities: 1) Direct observation, 2) post-observation interviews and 3) physiological measurements (GSR). I was aware that participants were aware of my presence, and accordingly tried to avoid distracting behaviors like obvious note taking and large body movements. This awareness was supported by the GSR data as on one occasion I inadvertently dropped my pen. I noted the time in my observation log, as I leaned forward to pick it up,. Later when viewing the GSR data, an obvious spike was evident at that very moment, and during interviews the participant confirmed being distracted by my actions at that time. While I had no delusions about being a fly on the wall, I did not intentionally try to be obtrusive. In an attempt to be

reflexive (Rossman and Rallis, 2003), I chose to directly discuss my presence with participants during the interviews.

Speaking to my role as researcher/observer, Laurier (2003) would suggest that my intimate experience with the course and tools used by participants could be considered a strength. I certainly feel that this was the case. For example, I was aware of the multiple ways to repeat a lesson section. I therefore found the idiosyncratic ways participants went about repeating sections interesting and of possible importance—I was able to discern nuances that would go perhaps unnoticed by a less vested observer. I avoided the temptation to make assumptions or “read meaning” into observed behaviors by discussing them with participants during interviews. I had also planned on videotaping all observations for more careful coding and analysis, but after reviewing the first three videotapes, I realized the futility of that effort. There was simply insufficient observable activity to merit videotaping in my judgment. Anything that needed to be observed was easily noted along with a timestamps in my observation log. In addition, using the video during interviews to refer to particular participant on-screen activities, proved to be logistically awkward and slow—and was therefore discontinued.

Similarly, my plan for using the GSR data also ended up deviating from the original plan. The GSR capture device was a small, lightweight, wireless armband worn on the upper arm. Physiological data (GSR) was recorded and graphed on a laptop computer present at the interviews. During interviews, the data was downloaded from the armband and displayed on the screen along a timeline. By way of “gross” analysis, I noted that 90-95% of events accounted for in my observation logs, also appeared on the GSR graph. There were however some GSR events for which I had no time-stamped field observation notes. These are the ones that I am particularly interested in, but for which I now have no means of elucidating. I also had no clear way to precisely (within milliseconds) tie observed GSR events to specific observed behaviors. That is, GSR events and those observed in my notes occurred simultaneously—as far as my relatively unsophisticated method of timing could tell. What this meant was that I could not use the GSR data to infer motivation for any observed self-

regulation behavior. Of course, any such inferences would still have been subject to participant corroboration. A certain amount of error is also inherent in the process. Bumping the GSR device would register an event, but may not have been observed by me. Likewise, I may have momentarily looked away when a relevant event occurred (see diagram below).

<b>Researcher Recorded</b>	<b>GSR Recorded</b>	<b>% of data overlap</b>
X (reached for mouse)	X (blip on graph)	90%
- (nothing observed by me)	X (blip on graph)	10%
X (jotted down notes)	- (nothing on graph)	
Error (missed an observable event)	Error (blip on graph)	

In any case, this aspect of the study needs additional work, but still holds promise in my mind especially if observation video were time-stamped/synchronized very closely to the GSR device's time.

Observations and interviews took quite a while, on average about 90-100 minutes. The time felt about right. After about 40 minutes, observations weren't yielding anything new, and interviews seemed to saturate at around 50 minutes. Some observations were a bit shorter due to students finishing their assigned lessons. Certainly more could be discussed, but out of respect for the time of the participants I ended the interviews and asked if I might contact them again with follow-up questions to which they all agreed.

Document analysis, a mainstay of much qualitative research, was fairly minimal in the course. It seemed that analysis of test scores was not likely to reveal anything too insightful, and furthermore that it might overshadow other more nuanced findings. Some of my participants took their quiz right after our observation period. Upon submitting their quiz, scores were immediately posted on the screen, including those from all previous quizzes and exams. No one objected to me seeing their exam scores, and in some cases I asked a question or two about them. I asked a couple participants to look at their scores over the semester, and see if they could make any correlation between the scores they were getting and the learning strategies or speed use. Answers revealed a

variety of reasons for particularly low scores and they usually reflected simply not having enough time that particular day or week to view the course materials. Other document analysis included a brief review of the student's notebooks. Student notebooks, purchased through the bookstore, included key frames from the graphics and animations presented with the video lessons. There were six frames per page with three blank ruled lines beneath each image for notes, much like the "handouts" page in Microsoft's PowerPoint.

I was curious as to how and whether they were taking notes. Here too, within my participants, there was great variety. Some took heavy notes in and around the key slides, most marked up the notes moderately circling key terms, underlining sections, adding their own thoughts, while one made nary a mark on his pages. Interestingly, despite the differences in note-taking, all participants had the notes open and in front of them while viewing the multimedia lectures, and only two of them appeared to stop the presentations now and then expressly for the purpose of note-taking. Note-taking is certainly a relevant self-regulated learning practice and the ability to stop an accelerated presentation to reflect and take notes underscores the importance and interdependence of multiple, simultaneous SRL practices.

### Findings

As mentioned, the qualitative approach looked to be an appropriate method to explore the nature of student VSP use and self-regulation behaviors. It was a way to help the implicit emerge and become explicit; a way to generate theory or make hypotheses from social research data that is systematically obtained and analyzed (Glaser & Strauss, 1967). In this section, I will begin to describe what appears to be emerging from the data--a preliminary description of some major themes found in the interviews. As not all the data has been thoroughly reviewed at this time of, findings are not reflective of the more thorough data analysis processes included in open, axial, and selective coding recommended for such a study by Strauss & Corbin (1998).

Students in general appeared to be quite good at self-monitoring—and quite deliberate about how they used Variable Speed Playback. Controlling the speed seemed to play an important early role in their regulatory behavior of all the participants. But, once comfortable speeds were identified fewer speed adjustments were made within lessons and other control affordances such as repetition, became more dominant. They did not adjust very often,(not dynamically) and chose instead to repeat sections rather than slow down. I wondered out loud with one participant if perhaps an acceleration foot pedal might be a nice device to have for speed control—sewing machine like. Would such a device encourage more dynamic and frequent employment of VSP as a self-regulated learning? The worst case scenario for using VSP controls meant that a participant had to set aside their notes from off their lap, lean physically forward, clear a space on the desk for the notes, put their pen down, grab the mouse, navigate to the VSP controls and then make an adjustment. It was not an easy and natural task, yet most participants situated themselves such that regulating playback speed in relation to their comprehension, took far less effort.

Another recurring self-monitoring and regulating theme was regarding attentiveness and concentration. “Speeding up helps me stay focused and keeps my attention better than normal speed” said Susie. “It saves time” said another participant.

“I mean the quicker I can get through the lesson the better. But I also want to understand it, you know. At first when I started doing it, I started at normal speed but that just drove me nuts because it just seemed so slow. So then I put it on double speed and that worked good for a while and then it just seemed like it was too slow too, so I sped up to about 2.2 and that seemed to work out good. Also, like, it forces me to focus and to concentrate because it’s going so fast that if I don’t--like if I doze off or something I’ll miss so much. Whereas if it’s just on normal speed, it’s kind of monotonous, it’s easy to not focus your thoughts, so I think it does kind of help you to focus when its going faster.

Repeating (replaying) lesson sections became a more dominant way of regulating comprehension than dynamic and frequent speed adjustments. Repeating still all occurred at higher than normal (1x) speeds. Jack mused that he expected his mind wandered less at higher speeds and that it actually reduced the number of times he’d have to rewind and repeat phrases or thoughts. This sentiment seemed universally held although a couple did relate equal mind wandering when viewing

too fast. Both points are borne out in the literature. (See Harrigan 1995, 2000; Gutenko, 1995; and King & Behnke, 1989 for a discussion on these issues.)

In either case, when participants felt they missed particular content, they chose more often to repeat a few lines rather than adjust speed. This of course, does not shed light on the speed adjustments that did occur. Two of my three female participants, Laura and Trisha, adjusted speed a couple different times during the lesson for related reasons. Laura started out her lesson in the accounting lab by setting her speed at 2.0x (2 times normal speed –or double speed).



**Figure 2--Accounting lab where 5 of 11 participants were observed**

After about a minute, she released the mouse and sat back in her seat, listening with her course packet notes open in front of her. She jotted down notes now and then, seemingly following along with the lectures. After about six minutes she leans forward and increased her speed to 2.1x, and sits back to view and write again. In about another eight minutes she slowed down the presentation noticeably to 1.7 times normal speed for about 1 minute, after which she accelerated back up to 1.9x. Never did she stop or replay sections. When asked what motivated her to slow down the audio, she said that the content was complicated, and she wasn't getting it—so she slowed down. This is a powerful example of using VSP as a self-regulated learning practice. Her lack of distraction was especially noteworthy to me since at one point the lab TA approached me and attempted persistently to engage me in conversation about what I was doing. I tried without success



for what seemed like minutes to communicate that I was busy and didn't want to chat. In interviews Laura recalled the distraction, but ignored it. Laura and I were both wearing headphones. It's an interesting idea that the use of headphones by all the participants, except those studying their materials at home, helped them manage and regulate their attention. Participants never said as much, but common sense would suggest it did help them concentrate and minimize distractions particularly in noisy lab setting like the accounting lab where TAs consulted with students and study groups met regularly and talked out loud (see figure 2).

Trisha also started her lesson out at 2.0x. She yawned repeatedly during the lessons. After one big yawn, she reached over and tried unsuccessfully to accelerate the presentation above 2.0x, but the control was maxed out. I chuckled inside. Since I was listening simultaneously with her, I knew what she was going through. Having not even had the background of this lesson, I easily understood the "common sense" material and was ready to pick up the pace and wished (as did she apparently) that the presentation could have been accelerated at that point. Her particular computer configuration did not allow higher speeds than 2.0x. Rather than skip ahead and risk missing something, Trisha relied strictly on VSP and acceleration to pick up the pace. When she ran into a more challenging section, she, like Laura slowed down to 1.8x for about 4 minutes. Her "slow" period in contrast to Laura, was interrupted with numerous short section replays—of course still at the relatively high speed of 1.8x.

Todd employed VSP in a unique way. He chooses to not adjust speeds during lessons sometimes even during the boring parts, instructor stories, or content he's familiar with. "During slow times, I'll get up and get some other things done...make me a sandwich and stuff." He said. "I like to keep the sound running so I don't miss stuff, but can still get other things done until I get to new material, and then I come back." He even described slowing lessons down a bit further, so he could get more other tasks done at the same time.

When I posed the question about what got in the way of her learning in this course, Laura stated emphatically "The instructor's examples! I think he waaaay over-explains things, way! And it

bugs me cuz I still have to go through it.” She also felt the need to accelerate through materials rather than skip ahead. This fear of skipping ahead is probably related to the medium of video. Video cannot be skimmed in the same way or as efficiently as text. The use of VSP to accelerate presentations, acts as a speed-reading tactic for learners.

Overall, course control affordances seem to facilitate SRL. All my participants were ahead of schedule in their course, rather than procrastinating. They hadn’t painted themselves into a corner—forcing themselves to go faster than they should have, just to meet course deadlines-- although remember that a TA had mentioned that some class members did fall prey to that scenario. Students loved the flexibility of the course. Its asynchronous nature helped them manage their study time both in this class as well as in their other, less flexible, classes. Jack’s words represent the feelings of all the participants in this regard:

I like being able to do it on my own time. I’m able to listen to the cds and what not, and also you can get ahead. You can kinda plan your weeks out...If you have a lot of homework in your other classes one week, you can look ahead—and get ahead in the accounting lessons, and if that week gets too hectic for ya, you don’t have to worry about it.

An interesting aspect of student’s self-regulation is that despite their limited time, participants will wind up viewing far more material than they ever would have received in the face-to-face class. They choose to view everything. They view all the remedial lessons, and helps that were designed for struggling students. Most participants believed that because they accelerated, they must be saving time. There were approximately 25 hours of additional instruction recorded for this course above and beyond what a student would have encountered in the face-to face version of the course. This fact, combined with the amount of replayed segments that I observed, was not likely compensated for by student acceleration rates.

The course quiz structure is not conducive to self-regulated learning, making it difficult to be learning for the right reasons. Perhaps out of necessity in such a large class, scores, and not qualitative feedback are continually being fed to students, instead of qualitative forms of feedback that might prompt deeper self-reflection (Corno & Randi, 1999). Yet, here too, students seem to be

taking responsibility for their learning and not just studying to perform well on the quizzes. Elliott & Dweck (1988) found in a study with 5<sup>th</sup> graders that when children using performance goals (i.e. must score high on quiz), failure and challenges are more likely to provoke a helpless response. But when children were instead focused on learning goals, failure and challenges were more likely to “provoke continued effort” (p.17). It would appear that in learning environments such as this multimedia accounting course, students that scored low seemed to feel like they just needed to study harder, slow the video down or study more effectively. One TA spoke to this issue when he described helping people in the accounting lab. “A lot of students will come to me and say, ‘hey I didn’t get any of this.’ And I’ll ask, ‘what speed did you watch it at?’ The majority of the time they listened to it at an accelerated pace, so I usually tell them to go back and listen to it again, slower.”

Rather than blame their intelligence, abilities or the teacher—the course seems to be structured to support self-regulatory practices and encourages students to take responsibility for both their learning as well as for the study strategies they employ. This is perhaps due to the “independent study” nature of the course and the levels of user control built into the course interface. As the designer of the technological aspects of the course (media and interface, but not pacing, assignments, course schedule or syllabus) it was my intent to build in a great deal of flexibility into a medium (video) not commonly known for its user-control affordances.

### Conclusions

Are students actively viewing their video instruction in such settings? The evidence would suggest that many do are. It also appears that active viewing is to some degree dependent on the level of control learners have over the video medium. Even with traditional television viewing, active viewing and regulatory practices are arguably more pronounced, at least at some level, with the holder of the remote, or in the case of “TIVO” owners, even more control is given to—and likely used—by viewers. Additional research is needed to explore the relationship between control affordances and self-regulated learning, but it is clear that SRL cannot occur without a certain level of

learner autonomy and control (Zimmerman and Schunk, 2001). This course, as it is implemented, appears to provide learners with sufficient controls, allowing them to develop and exercise a variety of active viewing and self-regulation behaviors. Of the available controls, variable speed playback appears to play a central regulatory role with these learners in this multimedia accounting course. VSP is pervasive in so many of the participant's SRL strategies, coloring the way they view and interact with their course materials. It's influence even carries over into their traditional lecture courses where some lamented not having the ability to accelerate and replay all their university instructors in like manner.

Not all self-regulated learning strategies are likely to be as effective as others. As they are identified with further research, I would suggest explicitly sharing effective VSP usage strategies with students to help encourage positive practices and discourage the enticement of using VSP to simply race through materials. The fairly homogeneous participants in this study all came from a university with quite competitive academic acceptance standards. It is unclear if a group of adult learners, community college or high school students would regulate their learning behavior similarly. Increased research is also needed in how GSR or other biofeedback devices might be used to help students self-monitor and develop self-regulated learning strategies.

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