

Understanding Students' Biological Clocks To Engage and Teach Them

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Abstract

Educators are concerned with drowsiness and a lack of attention of some students especially at the start of the school day. In doing a literature review, I have found that there are biological variables that affect student focus in the classroom related to human biological rhythms or more officially recognized in the scientific community as circadian rhythms. Reviewing the research in this area as it applies to the teaching of students would provide a better understanding that can equip frontline workers, in particular, with the necessary knowledge to counter the effects of students' natural rhythms with the appropriate environments that "correct" for these proclivities. In reviewing the research literature, I will provide some suggestions for a counter rhythmic classroom that I believe will prove successful in enhancing student engagement and consequently a better demonstration of the expectations and learning targets by sleepless students.

It is 8.45 am and the period one bell had just rang. You look at the roomful of students and you can tell who is tired already. Yet the period has just begun. How are you going to teach these wonderfully drowsy students the lesson? Fast forward, it is now period five on Friday, and you have noticed some significant absences from your final class. No one is sleepy, but many students appear tired, exhausted and weary from the week of assignments, tests, presentations and, of course, your interesting interactive lessons. You have homework written on your lesson plan. It says: "Compare your learning style to your multiple intelligence(s) using a Venn Diagram. Write a ½ page reflection on your comparison." You are not quite sure how this extra work will be received. Before you can write the homework on the board a student calls out: "Sir, do we have homework today?" Trying to face the student courageously, you notice an overworked and tired demeanor, almost irritable. Right then you decide that something is amiss and offering homework to this student can be interpreted as demeaning and harsh.

You want your students to be their best – retaining those formative points for the summative assessments. And when they are tired, like the ones with the work that other

teachers have been racheting upon them lately, feeling overwhelmed is a natural response. Or is it? Maybe if the rhythms in the life of a teenage student is understood, it would provide the necessary details in understanding how to teach more engagingly in the 21st century.

For teenagers, sleep-wake patterns determine much about performance, therefore, finding out the details of these circadian rhythms is advantageous to the educator. Wikipedia defines a circadian rhythm as roughly a 24-hour endogenous cycle in the biochemical, physiological, or behaviour processes of living entities which is regulated by environmental cues, the main one being light. The definite question, then, in relation to teaching and learning is, how does light affect the process.

Mariana Figueiro, a researcher concerned with designing better schools, having studied architecture and urbanism in Brazil, and continuing to research at New York's Rensselaer Polytechnic Institute found that it is a misalignment of teens' internal clocks with the time in the real world that creates a dilemma. By exposing subjects to light later in the mornings, earlier sleep times at night was achieved. She also found that sleep patterns also changed for shift workers and the elderly when they were exposed to short-wave blue light later in the morning. It appears that blue light tricks the human biological circadian rhythm and the firing of nerves on a 24-hour cycle that regulates heart rate, blood pressure, hormones and the sleep-wake cycle into sleeping earlier. Teens who are exposed to blue light at the wrong phase at 7 in the morning, for example, wearing goggles to block out the early light, were able to reset their body clocks in order to fall asleep earlier. Figueiro concluded that it would be helpful for students to maintain focus if schools allowed them to go outside for a mid-morning break, or even put blue LEDs around computer screens in classrooms to expose students to blue light at the right mid-morning time. Building schools based on maximizing the exposure to mid-morning light would be advantageous to the process of teaching and learning. (Rensselaer Polytechnic Institute (2010, July 26) Exposure to early evening sunlight in spring creates teenage night owls.

ScienceDaily. Retrieved October 1, 2010 from

[Http://www.sciencedaily.com/releases/2010/07/100726124420.htm](http://www.sciencedaily.com/releases/2010/07/100726124420.htm))

Being that most teens require 9 hours of sleep to maintain optimal alertness, it is imperative that controllable environmental factors be modified to suit the needs of learners. Mary Carskadon, professor of psychiatry and human behaviour at the Brown University School of Medicine found that at puberty teens push back bed-time although they do need the nine hours

for complete rest. Due to external factors like social events, homework, television and jobs they consistently get less sleep. Carskendon found that the secretion of melatonin, a hormone that signals sleepiness, is produced later in older adolescents indicating a shift in the nighttime sleep cycle to a later phase. As a result, teens with this shift are excessively sleepy in the morning hours. Based on the results of this study, some schools in the Minneapolis Public School system delayed starting times at the seven high schools (for about 7 000 students) by 85 minutes. Most teachers reported having a greater number of students who are more alert and they noted having less students falling asleep at their desks. Some states such as California and Connecticut are considering monetary support and legislation to modify school start times to accommodate the learning potential of teens due to this new understanding of biological and environmental determinants. (Sleepy Teens, Seasonal Rhythms, retrieved from <http://www.hhmi.org/biointeractive/clocks/fall/teenagers.html>)

In support of Carskendon conclusions, researchers at John Hopkins University found that teens who start school later may get better grades. (Bond, Mary. Teens and Sleep. Family Education. Retrieved from <http://life.familyeducation.com/teen/sleep/36140.html>)

In addition to the diminishing of concentration and learning due to a lack of sleep, and the potential to create accidents if the teen is driving, irregularities in sleeping can also be an indicator for the risk of developing depression in teens as well. Dr. Uma Rao, professor of psychiatry at Utah's Southwestern University states that "sleep is probably more helpful in determining who is at risk for developing depression than in being a diagnostic marker for depression...before they (adolescents) develop this illness." Irregular bedtimes may cause teens to be inadvertently predisposed to depression then. (UT Southwestern Medical Center (2009, August 14). Sleep Patterns in Children and Teenagers Could Indicate Risk For Depression. ScienceDaily. Retrieved October 1, 2010, from <http://www.sciencedaily.com/releases/2009/08/090813083335.htm>)

In conclusion, teens should be asked to turn off the TV at night, drink caffeine-free drinks, limit interactive and action packed video games, keep track of the time, and turn off the phone close to bedtime. (Retrieved from <http://homeworktims.about.com/od/timemangement/a/sleeptime.htm>). Also, educators should become aware of intervention strategies to use in planning for early classes that engage students. Knowing that perhaps sleepy and bleary eyed students would function more consistently and

intently through discussions or that they require a moving activity (centres, raft interviewing, jigsaw) to create energy in the room would give educators the chance to provide some of the environmental stimulus needed to change the effects of the biological determinants of the situation. Perhaps a differentiated instructional approach can give students the choice to choose a learning activity that best represent the way that they are feeling. And when that first bell rings, teachers can hope that the routine of waking up has truly began in the absence of a time machine. Also, not opening the shades before 10.15 could help in weeks to come.