COLUMBIA COLLEGE Factors that Affect Learning

NOTE: Must; Shall; Will: Should: May or Could; Can:

<u>Clarification of Terms</u> These words or phrases indicate actions or activities that are *essential* or *mandatory*. This word implies that it is highly desirable to perform certain actions or activities, but not essential or mandatory. These words imply freedom or liberty to follow an alternative to the action or activity being presented in a document.

Exercise and Learning

A great deal of research has been conducted, especially since the 1990s that has demonstrated that individuals who are more active perform better mentally than those who are less active. In many cases the performance of individuals, whether they be students or employees, is significantly better. What is amazing about the findings is that even low levels of physical activity will bring very positive results. For example those who exercise physically, on a regular basis, have better "long term memory, reasoning, attention, problem solving, even so called fluid intelligence" (Medina 2008, p.14). While the ideal level of activity seems to be 30 minutes of aerobic exercise two to three times a week, along with muscle strengthening activities, researchers have found that a low level of physical activities such as taking a 5 to 10 minute walk two to three times a day is not only a real boost to an individual's mental performance but will actually reduce the chances of heart disease and stroke. In fact, exercise not only improves mental performance of students and employees, it also reduces stress and even depression (Penninx, B.W. et al, 2002).

So, what does all this mean to Columbia College and what can we as faculty do to improve the performance of our students?

Since the human mind seems to slow down when we are sedentary for long periods of time, some faculty make sure students get a five minute physical break each hour. Others structure classroom activity where students are placed in situations where they are required to get up and move around the classroom. For example, they are placed in small groups to work on a project requiring them to stand up and move desks around, or they are asked to participate in a role playing situation or demonstration at the front of the class. They may be asked to come to a certain part of the room to observe a simulation or presentation. Some faculty have even gone so far as to ask students to stand and participate in several minutes of physical exercise. It has been suggested that the College set up a regular classroom with stationary bikes and the faculty member then delivers his/her lesson plan while each student pedals a bike at a slow speed throughout the class. Naturally it may take some time for students to feel comfortable with this situation, but the results may be most interesting and could have a very positive effect on student performance. Maybe in the future Columbia's dress policy will require students and faculty to wear gym clothes throughout the day.

The Effects of Attention on Learning

When we are asked to describe the best teacher or instructor we ever had, most of us would remember a certain individual. And when asked what made them good, certain attributes would come to mind. Most of them would include their ability to seek, get and retain our attention for long periods of time. Such things would come to mind as their level of excitement about their subject, their degree of knowledge, their method of presentation, their obvious respect for us as

 Document Name:
 Factors that Affect Learning
 Revision Date
 April 6, 2017

 Document Number:
 ADM-P208 Factors that Affect Learning.docxP208
 Approved by: Tom Snell

 Revision #1
 NOTE:
 Revisions to this document can be made following procedures outlined in Document #ADM-P014 – Document Control Policy and Procedures
 Page 1 of 9

learners, and their ability to emotionally engage us in the learning process both actively and collaboratively.

On the other hand, when we are asked to describe the characteristics of poor teachers we would often include such statements as disconnected, uninteresting, confusing, dry, and boring lectures.

The fact is that if faculty want to help students learn they must attract and retain their attention for long periods of time without students becoming bored and mentally checking out. To help achieve this Medina (2008, p. 79) suggests we take note of four factors. They are emotions, meaning, multitasking, and timing.

1. Emotions

First of all, emotionally arousing activities tend to be remembered much longer than nonemotional activities. They also tend to be remembered with much greater accuracy. Medina (2008, p. 81) states, "Regardless of who you are, the brain pays a great deal of attention to these questions:

- "Can I eat it? Will it eat me?"
- "Can I mate with it? Will it mate with me?"
- "Have I seen it before?"

These three basic human traits are within all of us and are critical for the very survival of the human species. Our brain is exquisitely tuned to identifying opportunities to reproduce; therefore, we quickly identify individuals or things we consider very attractive or intriguing (for example, Princess Diana or a shooting star). We also very quickly identify situations that are physically threatening to our safety (for example, an object falling towards us). Finally, the human brain is terrific at identifying patterns in our environment (for example, what number will follow 21, 31, 41...). We are quick to remember things that we think we saw before (Medina, p. 82).

A faculty member will quickly get the attention of his/her students if he/she uses any of these stimuli as part of an introduction to a statement.

2. Meaning

Medina (p. 83) describes the second human characteristic as a tendency to remember the "gist" of an event or experience before we start to remember the details. We also tend to forget the details before we start to forget the "gist". Most humans will tend to only remember detail when it is mentally placed in their mind in association with a larger picture (the "gist"). In fact, we increase our ability to remember facts by some 40 percent when we put them in a logically organized structure (or association) that is easy for us to remember. We are more capable of remembering facts when we clearly understand what they mean. In other words, as faculty members if we want students to remember certain concepts or terms, we need to help them first understand what each new fact or term actually <u>means</u>, and second, help them understand what logical association or relationship it has with other concepts or terms they have already learned. When we help students to see where certain concepts or terms fit into a larger picture such as a profession or occupation, they are much more capable of seeing its association with other concepts or terms together in a

Document Name: Factors that Affect Learning R	evision Date April 6, 2017
Document Number: ADM-P208 Factors that Affect Learning.docxP208	Approved by: Tom Snell
Revision #1 NOTE: Revisions to this document can be made following procedures outlined in Document #ADM-P014 – Document Control Policy and Procedures	Page 2 of 9

more meaningful way and they will be better understood and therefore retained longer as important knowledge within a discipline.

3. Multitasking

Although a human can walk and talk at the same time, this is not what is meant here about multitasking. In this context multitasking refers to the human brain simultaneously engaging in two separate thought processes at exactly the same time and it is simply not humanly possible (Medina, p. 85). Although we can shift from one thought to another and back again, it takes the human mind a few seconds to a few minutes to re-focus itself. This is why we will say, "Now where was I", after being interrupted from something we were focused on. Research has shown that people can take up to 50 percent longer to complete a task when they have been interrupted. They can also have up to 50 percent more errors than individuals who were not interrupted. This can be very costly and even dangerous while at work or when we are driving a car. It can also affect us when we are trying to listen to a faculty member make a presentation and something distracts our attention. It can also be difficult for us to keep our mind concentrating on a tedious presentation or boring lecture, and this is why Columbia College strongly encourages faculty to actively engage students in learning activities and keep lecturing to an absolute minimum.

4. Timing

One of the facts that faculty members who are experts in their particular fields must constantly remind themselves is that their students are novices in their field and as a result can very easily become lost, confused, frustrated, and disengaged when introduced to a term or concept. It is therefore critical that they take the <u>time</u> to move students from the introduction of a term or concept to its meaning, its relevance to the field of study, its various applications, opportunities to experience it in a meaningful way, and finally reflect on and evaluate what was experienced.

It is therefore important for faculty to not simply force feed students by pushing too much at them on a constant basis, but instead to allow them adequate time to comprehend, internalize and appreciate fewer concepts very well than lots of concepts very poorly.

The Ten Minute Rule

Research indicates that 10 minutes is the length of time that the human mind can concentrate on something; therefore it is important for faculty to make sure they are not engaged in one activity for longer than 10 minutes. A shorter time period would be even better. This basic fact should be kept in mind when developing a lesson plan and delivering it.

To effectively re-engage students' interest for the next 10 minutes Medina (2008) developed what he called "hooks". He found that the best hooks followed three principles:

- 1. Emotion must be a key part of the hook whether it be joy, fear, excitement, laughter, or even a strong narrative.
- 2. A hook should be relevant, to the point, and on topic. It can't simply be an entertaining interlude or joke.

Document Name: Factors that Affect Learning	Revi	sion Date April 6, 2017
Document Number: ADM-P208 Factors that Affect L	Learning.docxP208 A	pproved by: Tom Snell
Revision #1 NOTE: Revisions to this	document can be made following procedures outlined in Document #ADM-P014 – Document Control Policy and Procedures	Page 3 of 9

3. A hook can either become a conclusion or summary to a ten minute period. It could also be an introduction and a look at the ten minutes to come. Above all, the hook cannot be a boring thing.

Memory and Learning

Although it may go without saying, a critical component of learning is memory. What we learn, whether we are conscious of it or not, is actually placed in our memory system or brain (encoding) and remains there for either a short or long term period until it is recalled (decoding). The challenge we have as educators is understanding that how we present information to students will have a profound effect on whether it even goes into our students' memory systems or not and how long it will be stored there.

The following points are meant to help faculty create a more memorable learning environment for students (Medina, 2008). First of all, how a new piece of information is "introduced" to learners in the first place actually has a profound effect on whether it will even be remembered at all. Therefore the more exciting, elaborate, interesting, or stimulating the introduction the better.

Second, people remember something best when they understand what it "means". So make sure learners understand the meaning behind the information, concept or term. The better individuals understand what something means to them, the better they will remember it. Expecting students to simply learn something by memorizing it in order to regurgitate it on a test has no real value at Columbia College because they will not be able to remember it at work or apply it in some meaningful way.

Third, one of the best ways to provide meaning to new information is to provide "real world examples". Studies have shown that providing two or more examples significantly increased student memory more than one example did.

Fourth, the better the student can "relate" this new information with information that already exists in their mind the better it will be remembered (pattern matching). As faculty, we need to encourage this to happen.

Fifth, new information will be better understood and therefore better remembered if learners have an opportunity to experience it. This often involves using it or applying it in some meaningful way. In our classrooms at Columbia College this may involve using it to solve a problem (such as in a case study). In our labs this may involve putting it into actual use. In either case students should be asked to share what they are experiencing, observing, assessing, and discussing. They should also be asked to share what this means in a real life situation.

Sixth, to move something from short term memory to long term memory can take a good deal of time. The key to establishing something in long term memory is to repeatedly use and/or apply it again and again. The more often this occurs the better it will be remembered. This means we should try to spend most of our time focusing on the course's specific learning objectives and not bombard students with tons of theories and concepts that will be forgotten shortly after they have written an exam.

Document Name: Factors that Affect Learning	Revision Date April 6, 2017
Document Number: ADM-P208 Factors that Affect Learning.docxP208	Approved by: Tom Snell
Revision #1 NOTE: Revisions to this document can be made following procedures outlined in Document #ADM-P014 – Document Control Policy and Procedure	s Page 4 of 9

Seventh, to create a learning environment that has real meaning for students we need to constantly ask them "questions" regarding what they just read, heard, saw, or did. Questions like: So, what do you think about this, how do you feel, what would you do, what does this mean, where would you use it and when, where would you not use it and why, etc. This questioning process will cause them to internalize and think about what they just learned. The more they think about something the more it establishes itself in their memory. This questioning technique should occur at each of the preceding stages.

Rest and Learning

It may sound somewhat silly, however, a considerable volume of research indicates that not only do human beings (that is adults as well as children) need a proper night's sleep but people of all ages need an afternoon nap (Medina, 2008).

To support this statement Medina (2008) provides the following examples specifically related to adults. First, more traffic accidents occur in the mid-afternoon when drivers tend to nod off than at any other period of the day. Scientists have also learned that loss of sleep for one night will reduce cognitive skills by 30% and a subsequent drop in subject performance. Researchers have estimated that people who are deprived of sleep cost Canadian businesses over 10 billion dollars per year. It has also been found that when people are presented with a problem and then allowed to sleep on it (ie., allowed at least one night's sleep) their ability to find a solution increases by three hundred percent.

It has been concluded that lack of adequate sleep at night and lack of a nap during the day can seriously impact our ability to properly think. It affects our ability to maintain our concentration (eg., listening to others, or working at a task), it impairs our problem solving and creative abilities, it negatively effects our memory, and it can change our mood or emotional state. It can also impair our quantitative skill, logical reasoning ability and basic math skills. Finally, it can impair our manual dexterity and fine and even gross motor skills. Clearly, sleep is intimately related to our mental functioning and our ability to learn.

So what can be done to help people to be more effective mentally? First we should encourage people to get the amount of sleep at night they need to function effectively, keeping in mind that children need more sleep than adults and that younger adults need more sleep than much older adults. Second, people should be encouraged not to leave work or school assignments to the end of a course and then work late into the evening the night before or through the night expecting to do a good job. Third, people should be encouraged to take a mid-afternoon nap for a period of fifteen minutes in order to allow their brains a chance to rest. Although this is common practice in some countries, it certainly is new to Canada and Columbia College. It is also something that may take some time to establish within various departments, work areas, and classrooms but it is something that deserves a lot of discussion and possibly a number of different approaches. Although it may be too late in the day, it may even be valuable for faculty and students in late afternoon classes to take a fifteen minute period to lay their leads down within the first hour of class in order to let their minds rest.

It would be expected that if people get a better night's sleep as well as get an afternoon nap they will be able to think more clearly and maintain their attention for longer periods with greater ease. They will also be more creative and more effective problem solvers. Their memory will improve and their mood will remain more positive. They will reason better and perform quantitative skills such as math better. Finally, their fine and gross motor skills will improve.

 Document Name:
 Factors that Affect Learning
 Revision Date
 April 6, 2017

 Document Number:
 ADM-P208 Factors that
 Affect Learning.docxP208
 Approved by:
 Tom Snell

 Revision #1
 NOTE:
 Revisions to this document can be made following procedures outlined in Document #ADM-P014 – Document Control Policy and Procedures
 Page 5 of 9

Effect of Stress on Learning

Part of understanding the effects of stress on learning is to first understand what stress is. To begin with, stress can be both beneficial and it can be dangerous. It's not that easy to identify when people are experiencing stress. According to Medina (2008), "An aroused physiological state is characteristic of both stress and pleasure" (p. 173).

Kim and Diamond (2002) developed a definition of stress which consisted of three elements. They stated that if all three elements are present at the same time then a person is experiencing stress. First, a person must feel aroused physiologically. Second, the stress must be something the person wants to avoid. Finally, the person must feel they cannot control the situation (stress) they are experiencing (they feel helpless). This third element is probably the most critical. As people experience stress their pulse rate increases, their blood pressure increases, and their body releases a high amount of adrenaline which increases their energy. The more the stress, the greater the body responses. This causes people to react by either taking flight or standing to fight, either of which can be harmful. As we begin to feel stress our body not only reacts by dumping adrenaline into our system but shortly after this it also starts producing a body relaxant called cortisol which is designed to help us relax. The challenge is that our body can only produce so much cortisol in a given period and if we are working or learning in an environment that puts us under constant high stress then we may use up all our cortisol and eventually be unable to relax.

If our stress is at a low level we actually can learn better, solve problems more effectively and retain information better (Medina, 2008). The reality is that each of us responds differently to the same stress. While some people respond more favorably, others respond more negatively. Our job as faculty members and supervisors is to carefully monitor the response or stress levels of our students and employees and then take appropriate corrective action.

Chronic stress is stress people experience that goes on for extended periods of time. The effect of severe or chronic stress is that people get sick a lot more often. Over a prolonged period they may experience a heart attack or stroke. It may also affect their immune system which could impair the body from fighting infections. It can also cause an individual to go into depression.

The Center for Disease Control and Prevention states that stress is behind much of the lost work days and is related to some 80 percent of all medical expenditures. It has also been found that marital stress in the home affects people's ability to learn and perform at every age level.

In order to help reduce stress at Columbia College we first have to observe the behavior of our staff and students and listen to them. We can help them by identifying the causes of stress and work with them to try to reduce their stressors. Certainly good physical exercise, proper diet, and adequate sleep can help reduce stress. So can finding ways to help people get more in control of their learning or work environment. Part of this may include helping them to know what they will be experiencing so it doesn't come as a surprise. It may also include helping them to more clearly know what is expected of them and to give them the tools to do their job most effectively. It may also include giving them more than one option for how they approach a task or telling them to take whatever path they need to follow and then assess the outcome rather than the process. It may include offering to meet with them in private to discuss their issues and concerns, or offering extra time, classes, or tutorials. It may include evaluating their performance using alternate means such as developing a portfolio, making a presentation,

Document Name: Factors that Affect Learning Revision Date April 6, 2017
Document Number: ADM-P208 Factors that Affect Learning.docxP208
Revision #1
NOTE: Revisions to this document can be made following procedures outlined in Document #ADM-P014 – Document Control Policy and Procedures
Page 6 of 9

writing a paper, or doing a test verbally instead of in writing. It will include showing care and compassion and talking to them as responsible adults instead of children.

Since a lot of our staff and students have young children and since they experience a lot of stress trying to get them to daycare or school in the morning and picking them up in the evening, Columbia College is establishing a daycare service on its premises to help reduce the stress.

Another way to reduce stress is to include people as much as possible in decision making. This allows them to feel and be more in control. Stress is also reduced when people feel they are being treated more fairly using objective approaches versus subjective approaches.

To help students reduce stress Columbia College established the college foundation course. The course is designed to give students such basic skills as how to use a computer, develop study skills, learn how to do basic research and properly write a paper, learn how to set realistic goals and manage time effectively, etc. The College also established a Centre for Learning, Facilitating, and Assessment to help faculty and staff perform their duties more effectively.

Engaging our Senses to Learn

The most common method of instruction in North America has been for faculty to lecture to students. This is not only the students' least preferred method of learning but, based on research, the least effective. Richard Mayer has conducted extensive research on different methods of learning and has found dramatic results just by moving from the use of one sense to two. For example, Mayer (1997) found that when faculty utilize students' hearing and sight, their creative solutions to problem solving increased by 50 percent. They also had more accurate recall, better resolution, and it lasted longer. He further found that when touch is added to visual stimuli, recognition learning increased by almost 30 percent more than with touch alone. The results of Mayer's research and that of other cognitive psychologists clearly indicate that the more our senses are engaged in learning the more we learn and the better we perform.

For example, when faculty chooses to include multimedia equipment in their presentations they should consider the following principles developed by Mayer and presented by Medina (2008, p. 210):

- Multimedia principle: Students learn better from words and pictures than from words alone.
- Temporal contiguity principle: Students learn better when corresponding words and pictures are presented simultaneously rather than successively.
- Spatial contiguity principle: Students learn better when corresponding words and pictures are presented near to each other rather than far from each on the page or screen.
- Coherence principle: Students learn better when extraneous material is excluded rather than included.
- Modality principle: Students learn better from animation and narration than from animation and on-screen text.

Document Name: Factors that Affect Learning	Re	vision Date April 6, 2017
Document Number: ADM-P208 Factors that Affect Learning.doc>	(P208	Approved by: Tom Snell
Revision #1 NOTE: Revisions to this document c	an be made following procedures outlined in Document #ADM-P014 – Document Control Policy and Procedures	Page 7 of 9

At Columbia, our faculty attempt to engage as many of our students' senses as possible during a lesson. Their lessons will both actively and collaboratively stimulate learning. Such activities will cause the students to participate in a variety of activities where they may be engaged in simulations, presentations, manipulations, operations, situations, demonstrations, and applications of new concepts or items being studied.

Vision

Among our senses researchers have learned that the most powerful of all, when it comes to learning, is our sense of vision. They have learned, for example, that we are able to better remember pictures than text. The more visual the input the better humans are at recalling it (Medina 2008, p. 233). In fact, scientists discovered that when shown 2500 pictures for about 10 seconds each, subjects could remember over 90 percent of them several days later and about 63 percent of them a year later.

What scientists have learned is that pictures are actually much more effective at aiding learning than either oral presentations (lectures) or texts (traditional PowerPoint presentation) (Medina 2008, p. 234). Even more interesting, scientists have learned that when people are given something orally (a lecture) and then tested 72 hours later they remember about 10 percent of it. However, when they are presented with something using both oral (lecture) as well as pictures (graphs, charts, tables, etc.) retention rates increased to 65 percent. We actually tend to stop and visualize (or see in picture form) when we read or when we are told something. This mental process greatly aids in memory retention. However, students need to be allowed time for it to occur.

Medina (2008) also noted that:

- 4. We pay more attention to color than black and white
- 5. We pay a lot of attention to orientation
- 6. We tend to pay a lot of attention to size
- 7. We especially take note of things that move in our field of vision
- 8. We are attracted to animation (even very simple animation)

Based on this, faculty members should review their PowerPoint presentations and either completely eliminate text or reduce it to as little text as possible. They should constantly include colorful visuals to help make each important point, and they should be creating a learning environment full of visual stimuli that attracts and holds learner attention and increases learner memory retention ratios.

Learning from Experience

From the time we are born we have an innate desire to explore the world around us. We use all of our senses to study new objects by observing them, listening to them, touching them, manipulating, tearing, tossing, smelling and tasting them. By nature, we want to look around, investigate, try out, and analyze the world around us and we learn from those experiences.

Document Name: Factors that Affect Learning	evision Date April 6, 2017
Document Number: ADM-P208 Factors that Affect Learning.docxP208	Approved by: Tom Snell
Revision #1 NOTE: Revisions to this document can be made following procedures outlined in Document #ADM-P014 – Document Control Policy and Procedure	s Page 8 of 9

It is not surprising, then, that when we enter school we want to continue to explore and discover our world by experiencing it. This is why it is unfortunate that much of the education system has been structured into a highly mechanized assembly line with specific start and end dates, isolated subjects, grade levels, classrooms with row upon row of desks with students told to sit up straight in their seats, speak only when they are asked to speak, and tested on what they have been able to memorize using paper and pencil methods. Although the modern assembly line educational system is economically efficient there are serious questions about just how effective it is.

Many leading educators have offered alternative approaches to the modern traditional approach (list of references) that include problem based learning, experiential learning, and competency based learning. What is common about these approaches is that they are attempting to be more learner centered rather than system centered. They encourage the establishment of learning environments where students are actively and collaboratively engaged in learning rather than passively engaged receptacles. Probably the best example of a modern day educational program is the medical school where students learn from faculty members who are practitioners. Students spend a great deal of their time learning in class from these practitioners; however, they also spend a great deal of their time in a live learning environment called a hospital where they observe, interact, and begin practicing their profession. This is that environment where they can engage all their senses in learning and the type of environment that each program at Columbia College is doing its best to emulate by highly educated and experienced practitioners who actively and collaboratively engage students in classroom learning and where students are placed in cooperative education environments where they will be able to learn from and work with professionals who will be future peers.

References

- Kim, J.J. & Diamond, D. (2002). The stressed hippocampus, synaptic plasticity and lost memories *Natural Reviews Neuroscience 3*: 4534 4562.
- Mayer, R.E. (1997). Multimedia learning: are we asking the right questions? *Educ Psych 32(1):* 1-19.
- Medina, John (2008). *Brain rules, 12 principles for surviving and thriving at work, home, and school.* Seattle, WA. Pear Press.
- Penninx, B.W. et al (2002). Exercise and depressive symptoms *J. Gerontology Series B: Psychological Sciences and Social Sciences* 57:124 132.