

Chapter 2

Concentrated Learning: A Linear Approach to Knowledge for Higher Education

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Introduction

Accelerated, intensive and immersion learning are educational delivery methods that have been bandied about, experimented with, criticized and hailed as new, useful, useless or destructive, depending on one's point of view. Generally, the definition of accelerated learning is a course that is delivered in a shorter time than "normal" (Brookfield 2003; Lee and Horsfall 2012). Intensive learning, a version of accelerated learning, utilizes a longer daily time commitment than "normal," e.g., 4, 6 or even 8 h per day. Morgan-Short et al. (2011) argues that the concept of immersion learning, i.e., becoming involved with a discipline 24/7, has long held sway as a method for teaching languages, especially to adult learners. Csikszentmihalyi (1982) suggests that the combination of these methods should be labeled "concentrated learning" (22). We will use the term "concentrated" to mean a delivery of education that involves a shortened time span instead of the traditional 13–16 week semester, coupled with extended hours of study. Thus, students essentially immerse themselves in their study throughout their waking hours, in dialogue, group work, or solitary thoughtful pursuits. This chapter explores the question of whether concentrated learning can be a viable avenue for education. In truth, concentrated learning is not a new idea, but was the traditional learning pedagogy in the time of the Sophists. In addition to tracing the evolution of the pedagogy, this chapter examines the neurological and psychological implications for such concentrated learning in higher education, using two case studies based on real-life experiences.

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History

Some images of the ancient Greeks, most notably Socrates, Plato (1964), and Aristotle, show Socrates proceeding with lectures surrounded by an enthusiastic throng of students. This is not far from the truth. According to Marrou (1956), Socrates, seated in the center, surrounded himself with his students in the “shade of the sacred wood dedicated to the Academos” (67). There, Socrates conducted discussions with his students in rhetoric, the art of using words in oration (ostensibly to uncover the truths) (68). While we can envision students surrounding a Master, that is not to say that rhetoric was the sole discipline, i.e., subject of study, of the day. Aristophanes depicts Greek school children learning at the hands of their Master to include a variety of disciplines.

The focus here is not the disciplines per se, the individual subject of study, but rather the manner in which these subjects were taught; although, in practice, the delivery of a particular subject needs to be sympathetic to the subject taught. Plato (1964), in *The Republic*, depicts his ideal study where students would be engrossed in a particular study for years with little intervention of any other course of study. Marrou (1956) states, as per Plato (1964), that students would study “literature from 10–13, music from 13–16, and finally mathematic” (from 17 or 18) (76). Concentrated learning of a single subject was the hallmark of Plato’s school, the Academy. This method of concentrated, in-depth discussions based around a single subject for a prolonged period began to change as society advanced and finally evolved into what we now term, “modern” education.

Marrou (1956) points to the Christian schools as the beginning of the transformation to “modern” education in the fifth to the seventh century AD (336). Here, instead of studying through prolonged and concentrated discussion of one of the ancient subjects, students learned the Sacred Text through rote memorization; discussion was not allowed. He states, “The child was supposed to read the passage again and again until he knew it by heart—a sort of equivalent of our general method” (338). Marrou (1956) considers the pedagogy of the Christian schools, with its rote memorization, as the precursor pedagogy of today’s schools. However, similar to studying rhetoric through prolonged discussion of Plato’s times, the student now, through the rote memorization, was still engaged in concentrated learning—the complete immersion and study of the sacred Christian texts.

The transition from discussion then rote memorization concentrated in a single discipline or subject, and then the subsequent expansion to include a variety of subjects studied simultaneously, according to Compayré and Payne (1905), began in the Renaissance and continued through the sixteenth century. Various subjects of study introduced during this time had their foundations distilled into small portions of essential principles. Through intense and severe rote memorization of these portions, students achieved the perfection of the subject under study. As noted by Compayré and Payne (1905), Erasmus, one of the leaders of this movement, claimed, “As the body is nourished in infant years by little portions distributed at intervals, so should the mind of the child be nurtured by items of knowledge and adapted to its weakness, and distributed little by little” (90). Thus, the idea of bites

(one can call them classes) of different subjects, rather than concentration in one subject, was introduced.

Distilling the fundamental tenets of a single discipline into discrete portions of essential principles is the foundation that supports the introduction of subsequently more difficult bits and pieces to build the students' knowledge base. It also instills the idea that to progress to discussion and application of a discipline, the student must master that discipline's basic fundamental principles, sequentially. Erasmus's theory directly opposed the prevailing idea of the Ancients that by the use of rhetoric, and through prolonged discussion of the world and the case studies within the world, the basic truths of a discipline, or even the world, could be discovered.

As the Renaissance progressed, the study of disciplines expanded beyond Sacred Texts, rhetoric, music, and physical acumen to incorporate the newly discovered fundamentals of the natural sciences. Due to the explosion of subjects, e.g., astronomy, alchemy, medicine, as well as the growing interest that students had in studying these subjects, time management became an issue. The education span of the student required a discrete and delineated approach to time and an apportioning of the student's time to various disciplines. Over the next 300 years, through efforts of educators such as La Chalotais, Talleyrand and Condorcet, the education of the student transformed from a continuum of study into stages of primary, secondary and post-secondary education. Included in these stages were the refinements of a discipline "by little portion(s) distributed at intervals" (90). Thus, by the eighteenth century, the idea that chunks of knowledge, separated by time, beginning with fundamental knowledge acquired through memorization, became the prevalent educational model.

Concentrated Learning

The study of several subjects in sequential small portions has been part of the American educational scene since the American Revolution, according to Scott and Conrad (1992) and Wlodkowski (2003), due to both the history of parcelling out education into interdisciplinary bites as well as to acquiescence to the agrarian calendar. Scott and Conrad (1992) report the first break from this paradigm with courses that could be labelled intensive, occurring during summer courses at Harvard in 1869 on a non-credit basis. Johns Hopkins and the University of Chicago followed Harvard's lead, and Chicago offered some of the courses year-round on a quarterly basis. These summer intensive, short-term, single subject courses, in part, "were designed to upgrade elementary and secondary school teaching skills" (413). Summer sessions expanded and transformed to include "interim" sessions, i.e., such sessions normally consisting of three to four weeks (or less) of a single subject and taught between semesters, or before or after normal semesters (Conrad 1978, 1992). Adult learners form one population in which interim courses are uniquely established. Interim schedules meet the needs of adults and other non-traditional learners who have schedules that restrict their participation in a "normal" post-secondary,

12–16 week semester environment. With the emergence of the for-profit university, targeted towards working adults, many for-profit schools now adhere to a shorter 8-week subject term. In addition to serving the needs of adult learners, a shortened term provides the ability to reap the financial rewards by catering to those non-traditional learners, a growing constituency in American higher education.

According to the National Center for Education Statistics (NCES 2011), the number of 18–24-year olds in higher education will increase from 12,374,000 (2011) to 13,130,000 in 2020. Likewise, the number of non-traditional adults (25+) will increase from 8998,000 in 2011 to 10,709,000 in 2020, or to nearly 45% of the entire higher education student population. Due to this forecasted increase in student populations, institutions, neither for-profit, not-for-profit (private or public), do not want to lose any potential source of revenue (Wlodkowski 2003; Lee and Horsfall 2012). With the pressures of economics and space, especially in attracting and retaining older non-traditional students, the traditional 12–16 week semester format is difficult and thus a new, shorter timeframe is becoming a normal occurrence in higher education (Kasworm).

Issues

While concentrated learning in all its forms (intensive, accelerated, immersion) is a pedagogical method that is here to stay, it is not without its issues and critics. Wlodkowski (2003) points out the arguments against concentrated learning: (a) students need time to reflect and assimilate their learning; (b) time is required for neural networks to grow and establish new learning pathways; and (c) the amount of work required to complete a course simply cannot be accomplished in a shortened timeframe.

Previous Academic Studies

Csikszentmihalyi (1982) studied the relationship between concentrated time and learning in different studies and found that concentrated learning forms “deep concentration” (22). This deep concentration both enhanced the educational level and led to a higher level of satisfaction with the course subject as reported by students in the study who took a course in the concentrated format. Additionally, such concentration created a more rewarding environment for learning and absorption of a discipline’s knowledge. As an added bonus to the absorption of learning, Scott (2003) showed that students felt their accelerated courses provided them a higher level of satisfaction than traditional courses. Students reported that they were able to “synthesize the material better,” they were able to “really get into something without the class ending,” and “felt there was less downtime in intensive courses” (35). As Scott (2003) reports, two different students state:

I think that a lot of the way [sic] that people learn and retain information is [sic] directly related to how intense the experience is while they're learning it. If I have an experience that's not particularly intense, that's spread out over a long period of time, at no point ... will I have my mind into it. I really won't have a devotion to the subject or to the material... I remember things that affect me intensely, and because this class for a period of six or eight weeks was really a big part of my life, and it was something that I was thinking about all the time, I think that will always occupy a space in my brain. (35–36)

And

You were constantly studying this stuff, and you knew with the final only three weeks away ... you didn't forget it... You didn't have to go back and re-learn it all. (36)

In the study by Lee and Horsfall (2012), where a traditional 12-week course was compressed to a 6-week course, the reactions from both faculty and students also were positive. Their study, conducted at Swinburne University in Australia, was conducted with over 500 students and taught by 12 faculty members, in both 12 and 6-week courses. Of these 500+ students, one hundred and fourteen students responded to the survey. Of these students, 76% rated their experience with the accelerated course as positive while only 7% felt negative about such a delivery format. In addition, only 14% of the students felt that they were less confident in the material learned in the 6 weeks as opposed to the remaining 86% of students who felt more or equally confident about material learned in the 6-week courses versus a 12-week course (25% and 61%, respectively).

One interesting area came when the students reported a marked increase (74%) in the effort and motivation in the 6-week course (196). This increase in motivation might be reflective of Bandura's self-efficacy theory. As Onwuegbuzie and Jiao (2004) explain, Bandura's self-efficacy theory could show that an "individual's belief system influences his or her behavior choices, efforts expended, levels of persistence, and task success" (51).

While students respond well to concentrated learning, both Daniel (2000) and Wlodkowski (2003) found the adults respond particularly well to accelerated delivery formats (shortened from the traditional 12–16 week format) and recommend them as a format for teaching adults. Wlodkowski and Westover (1999) conducted research into three courses (Accounting, Law and Introduction Philosophy) adults took and found that in the accelerated delivery format, "adult students completed content mastery and performance-based assessments. These measures indicate that 80% of these students demonstrated learning rated as satisfactory or above by faculty experts" (1). In a similar study, Wlodkowski, Mauldin and Iturralde-Albert (2000) found that in a concentrated study of courses conducted in Spanish in Puerto Rico, the performance by older adults averaged higher than the performance by traditional-aged students taking the same courses in a conventional (traditional) post-secondary format.

At the University of Montana Western, Thomas and Roberts (2009) report that the traditional-aged students accept the accelerated course format well. This accelerated course structure was coupled with an eighteen-hour instruction day, one-class-at-a-time immersion format into a concentrated learning format. This program format has been so successful (detailed later in this chapter) that the University of Montana

Western became the first 4-year public university in the United States to adopt such a course delivery system for the majority of its classes.

Although student and faculty interest appeared positive for concentrated learning by 2007, there was not yet any evidence that concentrated delivery affected retention. Addressing this question, Baun (2009) found that in a comparative study between a 13-week legal skills course and the same course in a concentrated format, there was no statistically significant difference in learning and retention between the traditional and concentrated courses deliveries as measured at 2 weeks and 3 months after the completion of the course.

Neurological Studies

In light of the argument against single-class-at-a-time concentrated learning, neuroscientists have begun to investigate how concentrated learning relates to the development of neural pathways and brain plasticity as part of the overall research into learning and the human brain. As neuroscientists, and their technology, become more sophisticated in their ability to discover how learning affects the brain and how different educational formats affect the brain, more and more evidence becomes known regarding new and more effective ways to stimulate the learning pathways of students' minds.

Although research is ongoing, Rumsey (2011) states:

Firstly, the person concerned must be aware of and pay close attention to the experiences. Secondly, the experiences should have some degree of challenge and novelty. Thirdly, the person concerned should diligently engage with the experiences, that is, have a conscious awareness, focus and participation. Fourthly, thinking is just as important as doing, for example, interpretation, analysis, reflection, mental rehearsing and meditation. Fifth, there needs to be substantial practice, repetition and reinforcement. Sixth, the person needs to be emotionally aroused by the experiences. This could be positive arousal as in rewarding and satisfying experiences or negative arousal as in situations involving fear and threat. Sixth, involvement in the experience must be active and passionate (not passive), requiring focus, effort, commitment and persistence. Seventh, the person concerned should have a positive attitude, commitment and enthusiasm for the activities involved in the experiences (and their outcomes). (55)

According to Davachi et al. (2011), the development of neural pathways requires the necessity of concentration and the disengagement from distraction. As Davachi et al. (2011) state, "*Focusing on multiple streams of information, including trying to multitask in the learning environment also results in neurons decreasing their firing and, hence, learning decreases significantly*" (2).

This study also argues against the mistaken idea that single focused "cramming" is a desirable way to learn. According to Karpicke and Roediger (2007), learning needs to be interspersed with delays in which a student can reflect upon his or her learning. However, these delays can vary from 10 min to 24 h, a practice defined as spacing. As Davachi et al. (2011) point out, neuroscientists know that spacing

helps retrieval and builds better long-term memory. Thus, neurologically speaking, concentrated learning sessions must be constructed in a manner so that information is parsed out in sections that are spaced within the learning timeframe and then recalled shortly within the shortened timeframe. These recalls, coupled with a feedback mechanism, appear to provide the strongest neuroplasticity build within the brain and to provide a student with optimal learning and retention.

Another factor coming from neurological studies concerns the amount of information “chunks” or packets that individuals can absorb at any one time. According to studies by Linden et al. (2003) and Bavalier (2012), the number of new concepts that individuals can retain within their brains is between three and seven distinct packets of information at any one time. According to Bavalier (2012), the low number of processing chunks is the norm for most individuals. Individuals who are heavily engaged in visual stimuli, such as action video games, scored toward the higher number of processing chunk ability.

While information needs to be parsed out, the amount of information that an individual can absorb is unknown (Davachi et al. 2011). These packets of information need “digestion time” (9). One of these digestion times is sleep (Peigneux et al. 2001). During certain parts of REM sleep, the brain forms synaptic connections. These connections are the elements, along with repetition, that provide a strong memory of a subject.

While the number of repetitions necessary for a particular knowledge chunk to cement itself within the brain is not fixed, sufficient repetition for the individual leads to “ownership” of the content and, through activation of the hippocampus, creates the associations that lead to a strong memory (Davachi et al. 2011, p. 4). In a study by Davachi and Wagner, enhanced memory was associated with an enhanced activation of the hippocampus. These associations rely on the learner comparing this content to their own knowledge and then going deeper, i.e., partaking in the “deep concentration” alluded to by Csikszentmihalyi (1982).

This integration of existing and new knowledge along with deep concentration can be stimulated by having students integrate their own knowledge with the content taught through exercises and personal experience integration of the content, which can be done within or outside of the classroom and through individual or group assignments. Another method of stimulating the hippocampus and integrating the content into memory is through questioning. Using open-ended questions that force the student to integrate personal experiences with content reinforces the repetition and the ownership of the content, and allows easier retrieval of content.

Time

One argument made by professors wedded to the traditional 16-week semester is that there simply is not enough seat time (time in the classroom) or outside time (time spent working outside of the classroom either individually or in groups) in

concentrated courses as there is in a traditional semester. A legitimate defense against that argument comes from Karweit (1984). In his major study of the synthesis of time and learning, he found that while some lapse time is “necessary for learning” (33), the amount of lapsed time is not dispositive, nor is it a sufficient condition of learning. Conrad (1978, 1992), Stuckey (2007), and Sullivan et al. (2007), all address this issue by arguing that simply by retraining professors to a new paradigm of concentrated learning and restructuring the syllabus, the time argument against concentrated learning can be mitigated.

Looking at the semester calendar suggested by the Western Association of Schools and Colleges (WASC) of 147 instructional days based on Carnegie units of 1 h of seat time and 2 h of outside time per week per credit hour, a one-credit course could meet the equivalent number of hours in five consecutive 8-hour days. A three credit hour course could meet the same instructional seat and outside time requirements in a 15-day concentrated course. If one assumes that the student only takes one course in a concentrated format at a time, and the deep concentration that Csikszentmihalyi (1982) refers to happen in off hours, the time a student would be working or thinking of a course could be reduced even further.

Coupled with the argument of time is the argument of interference, where other courses overload the mind, thus “interfering” with the knowledge in a current course. Interference may have a deleterious effect on learning. Conrad (1978, 1992) found that a multiple course load does not give a student the proper reflection time and thus may disturb the synaptic connections, as postulated by Milner (1999), before they are truly set, thus leading to loss of memory. However, Lusting et al. (2001) found that individuals who were subject to multiple stimuli demonstrate variance in retrieving memory and those individuals who are less efficient at retrieval may require a longer time span for accurate information retrieval. Subjecting a student to one course at a time of concentrated learning eliminates any argument of interference of multi-course studies.

Interference, as an argument against concentrated learning, was believed to be a factor that led to memory loss. However, a study by Boddy displaced this idea that interference was a mitigating factor in memory loss over time as opposed to retention and retrieval of concurrent learning. In his study, Boddy compared a compressed format with a traditional format at the University of Nebraska in courses of Computer Science, History, and Education Law, using the same instructor in both formats. In a multiple regression analysis, using final grades and seven independent variables, Boddy found that interference was not a determining factor.

Although Boddy used a compressed versus traditional higher education format, the main thrust of his research was interference’s effects in memory loss as opposed to learning and retention. Conrad (1978, 1992) reports that up until 1992, only three studies comparing compressed formats with traditional formats existed and these were not in higher education but rather, high school.

Studies: Baun 2007

Finding a lack of studies of concentrated delivery format in higher education, I undertook a study in the academic year 2006–2007 that specifically targeted learning and retention in a comparative analysis of a traditional delivery format course versus a highly concentrated delivery format. This study was commissioned because of both the school's and the director's desire to know whether there was a difference in learning and retention between the two course formats. The study was designed as a quasi-experimental, non-randomized post-test between two groups in a one-credit Trial Advocacy course in an American Bar Association (ABA) accredited law school. The groups consisted of two sessions of concentrated learning and two sessions conducted in a traditional delivery format. The concentrated learning took place over nine consecutive days, each day consisting of 6–8 h of instruction and required additional outside time. The study measured outcomes from the concentrated delivery against the outcomes from the traditional format of 1 h a week of seat time and corresponding outside time. The curriculum was the same for both groups and taught by the same instructors and practitioners.

The motivation for the two methods of instruction was due to the school's desire and need to accommodate two different cohorts of students in the law school. One cohort consisted of traditional full-time graduate students. These students enrolled in courses during the day in two semesters, each 13 weeks in length, although they had the option to take the night class. The other cohort of students in the school consisted of non-traditional, night graduate students who, for the most part, were full-time employees during the day. These night students were not available to take the course over the 13-week traditional timeframe. To accommodate these night students, since the school did not offer the Trial Advocacy course in the evening, the school initiated, several years prior, a pre-semester concentrated Trial Advocacy course. This pre-semester course was offered prior to the fall semester and again between the fall and the spring semesters. Students in both cohorts had the option of taking the course in either format, depending on their schedules.

After consultation with the faculty and the Director of the program, the study design employed quantitative analysis through a designed instrument consisting of questions that covered both the text and application of trial processes in a trial. The questions of the instrument were designed in cooperation with the Director and instructors. To compare the learning versus retention, the Department of Institutional Research (DIR) asked students to complete the questionnaires one to 2 weeks after the end of the course and again at 3 months after the completion of the course.

The Director of the Trial Advocacy program informed the students in all four sessions of the participation and the purpose of the study. The Department of Institutional Research collected all data for the study. The DIR e-mailed the instrument to the students, collected their completed questionnaires, and collected and compiled all data and withheld, in confidence, all personal and identifying information, from the researchers. A total of 540 ($N=540$) students participated in all four sessions with a total of 98 ($N=98$) students participating after 2 weeks and 54 ($N=54$)

students participating at three months. All questions on the instrument were close-ended, unordered questions.

The study's Grand Question was: "There is no statistically significant difference of learning and retention, over time (3 months), between students taught via an accelerated course delivery versus the learning and retention, over time (3 months), of students taught via a traditional semester long program." This Grand Question actually broke down as two null hypotheses. They were: (1) there is no statistically significant difference in the learning (as measured 1 week after completion of the course) between students taught in a traditional method versus an accelerated (concentrated) method, and (2) there is no statistically significant difference in retention (as measured 3 months after completion of the course) between students taught in a traditional method versus an accelerated (concentrated) method.

After compiling the results and eliminating results for students either who did not complete the questionnaire, or who completed the questionnaire improperly, an SPSS analysis using a T statistic was calculated. The results of the first null hypothesis calculation showed that the null hypothesis was not rejected ($t[96] = 1925$, $p = 0.057$). The results of the second null hypothesis calculation showed that the second null hypothesis was not rejected ($t[52] = -1302$, $p = 0.199$), leading to the conclusion that there was no statistically significant difference in either learning or retention, based on the course's format of traditional or concentrated delivery.

Studies: University of Montana Western

While the interim legal skills study, detailed above, was grounded in a humanities-based discipline, the question remains: Can concentrated learning be used in the sciences or can concentrated learning be the norm for a 4-year institution of higher education? Robert Thomas and Sheila Roberts (2009) from the University of Montana Western (UMW) addressed the answer in an article.

In the mid-1990s, the faculty at University of Montana Western noticed that students who were engaged in geological fieldwork appeared to have a significantly lower rate of absenteeism versus students in lecture classes. It also appeared that students in fieldwork appeared to learn at a deeper level in scientific concepts and skills than in lecture-based classes with similar scientific concepts. These observations, coupled with difficulties of geological fieldwork in less than a concentrated manner, (Thomas and Roberts (2009) use "immersion" where we will use the term concentrated) drove several faculty members to come up with a new model and paradigm for courses at University of Montana Western that would solve both the fieldwork issue and the lecture absentee rate.

To solve this problem, UWM looked to Colorado College, a private four-year Liberal Arts and Sciences college, which used a different educational model that Colorado College termed a "block plan." This block plan consisted of students taking one course at a time throughout their entire college career. In 1997, the University of Montana Western received a grant from the US Department of Education's Fund for the Improvement of Post-Secondary Education (FIPSE) to implement a 3-year pilot program based on Colorado College's block plan entitled: Experience One.

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