

**Chapter 1 : Teaching Concepts: Motivation**

*Encuentra The Mathematics of Human Motivation: Applying the Law of Escalating Marginal Sacrifice de Phil Grant, Philip C. Grant (ISBN: ) en Amazon.*

A Theory of Human Motivation A. Maslow Originally Published in Psychological Review, 50, Posted August [p. These conclusions may be briefly summarized as follows: The integrated wholeness of the organism must be one of the foundation stones of motivation theory. The hunger drive or any other physiological drive was rejected as a centering point or model for a definitive theory of motivation. Any drive that is somatically based and localizable was shown to be atypical rather than typical in human motivation. Such a theory should stress and center itself upon ultimate or basic goals rather than partial or superficial ones, upon ends rather than means to these ends. Such a stress would imply a more central place for unconscious than for conscious motivations. There are usually available various cultural paths to the same goal. Therefore conscious, specific, local-cultural desires are not as fundamental in motivation theory as the more basic, unconscious goals. Any motivated behavior, either preparatory or consummatory, must be understood to be a channel through which many basic needs may be simultaneously expressed or satisfied. Typically an act has more than one motivation. Practically all organismic states are to be understood as motivated and as motivating. Human needs arrange themselves in hierarchies of pre-potency. That is to say, the appearance of one need usually rests on the prior satisfaction of another, more pre-potent need. Man is a perpetually wanting animal. Also no need or drive can be treated as if it were isolated or discrete; every drive is related to the state of satisfaction or dissatisfaction of other drives. Lists of drives will get us nowhere for various theoretical and practical reasons. Furthermore any classification of motivations [p. Classifications of motivations must be based upon goals rather than upon instigating drives or motivated behavior. Motivation theory should be human-centered rather than animal-centered. The situation or the field in which the organism reacts must be taken into account but the field alone can rarely serve as an exclusive explanation for behavior. Furthermore the field itself must be interpreted in terms of the organism. Field theory cannot be a substitute for motivation theory. Not only the integration of the organism must be taken into account, but also the possibility of isolated, specific, partial or segmental reactions. It has since become necessary to add to these another affirmation. Motivation theory is not synonymous with behavior theory. The motivations are only one class of determinants of behavior. While behavior is almost always motivated, it is also almost always biologically, culturally and situationally determined as well. The present paper is an attempt to formulate a positive theory of motivation which will satisfy these theoretical demands and at the same time conform to the known facts, clinical and observational as well as experimental. It derives most directly, however, from clinical experience. This theory is, I think, in the functionalist tradition of James and Dewey, and is fused with the holism of Wertheimer 19 , Goldstein 6 , and Gestalt Psychology, and with the dynamicism of Freud 4 and Adler 1. It is far easier to perceive and to criticize the aspects in motivation theory than to remedy them. Mostly this is because of the very serious lack of sound data in this area. I conceive this lack of sound facts to be due primarily to the absence of a valid theory of motivation. The present theory then must be considered to be a suggested program or framework for future research and must stand or fall, not so much on facts available or evidence presented, as upon researches to be done, researches suggested perhaps, by the questions raised in this paper. Two recent lines of research make it necessary to revise our customary notions about these needs, first, the development of the concept of homeostasis, and second, the finding that appetites preferential choices among foods are a fairly efficient indication of actual needs or lacks in the body. Cannon 2 has described this process for 1 the water content of the blood, 2 salt content, 3 sugar content, 4 protein content, 5 fat content, 6 calcium content, 7 oxygen content, 8 constant hydrogen-ion level acid-base balance and 9 constant temperature of the blood. Obviously this list can be extended to include other minerals, the hormones, vitamins, etc. Young in a recent article 21 has summarized the work on appetite in its relation to body needs. If the body lacks some chemical, the individual will tend to develop a specific appetite or partial hunger for that food element. Thus it seems impossible as well as useless to make any list of fundamental physiological needs for they can come to almost

any number one might wish, depending on the degree of specificity of description. We can not identify all physiological needs as homeostatic. That sexual desire, sleepiness, sheer activity and maternal behavior in animals, are homeostatic, has not yet been demonstrated. Furthermore, this list would not include the various sensory pleasures tastes, smells, tickling, stroking which are probably physiological and which may become the goals of motivated behavior. In a previous paper 13 it has been pointed out that these physiological drives or needs are to be considered unusual rather than typical because they are isolable, and because they are localizable somatically. That is to say, they are relatively independent of each other, of other motivations [p. This is true less generally than has been thought exceptions are fatigue, sleepiness, maternal responses but it is still true in the classic instances of hunger, sex, and thirst. It should be pointed out again that any of the physiological needs and the consummatory behavior involved with them serve as channels for all sorts of other needs as well. That is to say, the person who thinks he is hungry may actually be seeking more for comfort, or dependence, than for vitamins or proteins. Conversely, it is possible to satisfy the hunger need in part by other activities such as drinking water or smoking cigarettes. In other words, relatively isolable as these physiological needs are, they are not completely so. Undoubtedly these physiological needs are the most pre-potent of all needs. What this means specifically is, that in the human being who is missing everything in life in an extreme fashion, it is most likely that the major motivation would be the physiological needs rather than any others. A person who is lacking food, safety, love, and esteem would most probably hunger for food more strongly than for anything else. If all the needs are unsatisfied, and the organism is then dominated by the physiological needs, all other needs may become simply non-existent or be pushed into the background. It is then fair to characterize the whole organism by saying simply that it is hungry, for consciousness is almost completely preempted by hunger. All capacities are put into the service of hunger-satisfaction, and the organization of these capacities is almost entirely determined by the one purpose of satisfying hunger. The receptors and effectors, the intelligence, memory, habits, all may now be defined simply as hunger-gratifying tools. Capacities that are not useful for this purpose lie dormant, or are pushed into the background. The urge to write poetry, the desire to acquire an automobile, the interest in American history, the desire for a new pair of shoes are, in the extreme case, forgotten or become of sec-[p. For the man who is extremely and dangerously hungry, no other interests exist but food. He dreams food, he remembers food, he thinks about food, he emotes only about food, he perceives only food and he wants only food. The more subtle determinants that ordinarily fuse with the physiological drives in organizing even feeding, drinking or sexual behavior, may now be so completely overwhelmed as to allow us to speak at this time but only at this time of pure hunger drive and behavior, with the one unqualified aim of relief. Another peculiar characteristic of the human organism when it is dominated by a certain need is that the whole philosophy of the future tends also to change. For our chronically and extremely hungry man, Utopia can be defined very simply as a place where there is plenty of food. He tends to think that, if only he is guaranteed food for the rest of his life, he will be perfectly happy and will never want anything more. Life itself tends to be defined in terms of eating. Anything else will be defined as unimportant. Freedom, love, community feeling, respect, philosophy, may all be waved aside as fripperies which are useless since they fail to fill the stomach. Such a man may fairly be said to live by bread alone. It cannot possibly be denied that such things are true but their generality can be denied. Emergency conditions are, almost by definition, rare in the normally functioning peaceful society. That this truism can be forgotten is due mainly to two reasons. First, rats have few motivations other than physiological ones, and since so much of the research upon motivation has been made with these animals, it is easy to carry the rat-picture over to the human being. Secondly, it is too often not realized that culture itself is an adaptive tool, one of whose main functions is to make the physiological emergencies come less and less often. In most of the known societies, chronic extreme hunger of the emergency type is rare, rather than common. In any case, this is still true in the United States. The average American citizen is experiencing appetite rather than hunger when he says "I am [p. It is quite true that man lives by bread alone -- when there is no bread. This is what we mean by saying that the basic human needs are organized into a hierarchy of relative prepotency. One main implication of this phrasing is that gratification becomes as important a concept as deprivation in motivation theory, for it releases the organism from the domination of a relatively more physiological need,

permitting thereby the emergence of other more social goals. The physiological needs, along with their partial goals, when chronically gratified cease to exist as active determinants or organizers of behavior. They now exist only in a potential fashion in the sense that they may emerge again to dominate the organism if they are thwarted. But a want that is satisfied is no longer a want. The organism is dominated and its behavior organized only by unsatisfied needs. If hunger is satisfied, it becomes unimportant in the current dynamics of the individual. This statement is somewhat qualified by a hypothesis to be discussed more fully later, namely that it is precisely those individuals in whom a certain need has always been satisfied who are best equipped to tolerate deprivation of that need in the future, and that furthermore, those who have been de-[p. All that has been said of the physiological needs is equally true, although in lesser degree, of these desires. The organism may equally well be wholly dominated by them. They may serve as the almost exclusive organizers of behavior, recruiting all the capacities of the organism in their service, and we may then fairly describe the whole organism as a safety-seeking mechanism. Again we may say of the receptors, the effectors, of the intellect and the other capacities that they are primarily safety-seeking tools. Again, as in the hungry man, we find that the dominating goal is a strong determinant not only of his current world-outlook and philosophy but also of his philosophy of the future. Practically everything looks less important than safety, even sometimes the physiological needs which being satisfied, are now underestimated. A man, in this state, if it is extreme enough and chronic enough, may be characterized as living almost for safety alone. Although in this paper we are interested primarily in the needs of the adult, we can approach an understanding of his safety needs perhaps more efficiently by observation of infants and children, in whom these needs are much more simple and obvious. One reason for the clearer appearance of the threat or danger reaction in infants, is that they do not inhibit this reaction at all, whereas adults in our society have been taught to inhibit it at all costs. Thus even when adults do feel their safety to be threatened we may not be able to see this on the surface.

**Chapter 2 : The Ten Principles of Motivation - Teachingcom**

*"The Mathematics of Human Motivation is an effort to advance the theory of human motivation. Professor Grant has created a theory development book that involved construction and analysis of a mathematical framework for exploring the intricacies of human motivation and satisfaction.*

Definition of Motivation Motivation is typically defined as the forces that account for the arousal, selection, direction, and continuation of behavior. Nevertheless, many teachers have at least two major misconceptions about motivation that prevent them from using this concept with maximum effectiveness. One misconception is that some students are unmotivated. Strictly speaking, that is not an accurate statement. As long as a student chooses goals and expends a certain amount of effort to achieve them, he is, by definition, motivated. What teachers really mean is that students are not motivated to behave in the way teachers would like them to behave. The second misconception is that one person can directly motivate another. This view is inaccurate because motivation comes from within a person. What you can do, with the help of the various motivation theories discussed in this chapter, is create the circumstances that influence students to do what you want them to do. Many factors determine whether the students in your classes will be motivated or not motivated to learn. You should not be surprised to discover that no single theoretical interpretation of motivation explains all aspects of student interest or lack of it. Different theoretical interpretations do, however, shed light on why some students in a given learning situation are more likely to want to learn than others. Furthermore, each theoretical interpretation can serve as the basis for the development of techniques for motivating students in the classroom. Several theoretical interpretations of motivation -- some of which are derived from discussions of learning presented earlier -- will now be summarized. After demonstrating that organisms tend to repeat actions that are reinforced and that behavior can be shaped by reinforcement, Skinner developed the technique of programmed instruction to make it possible for students to be reinforced for every correct response. According to Skinner, supplying the correct answer--and being informed by the program that it is the correct answer--motivates the student to go on to the next frame; and as the student works through the program, the desired terminal behavior is progressively shaped. Many times the reward takes the form of praise or a grade. Sometimes it is a token that can be traded in for some desired object; and at other times the reward may be the privilege of engaging in a self-selected activity. Operant conditioning interpretations of learning may help reveal why some students react favorably to particular subjects and dislike others. For instance, some students may enter a required math class with a feeling of delight, while others may feel that they have been sentenced to prison. Skinner suggests that such differences can be traced to past experiences. He would argue that the student who loves math has been shaped to respond that way by a series of positive experiences with math. The math hater, in contrast, may have suffered a series of negative experiences. The Power of Persuasive Models Social learning theorists, such as Albert Bandura, call attention to the importance of observation, imitation, and vicarious reinforcement expecting to receive the same reinforcer that we see someone else get for exhibiting a particular behavior. A student who identifies with and admires a teacher of a particular subject may work hard partly to please the admired individual and partly to try becoming like that individual. A student who observes an older brother or sister reaping benefits from earning high grades may strive to do the same with the expectation of experiencing the same or similar benefits. A student who notices that a classmate receives praise from the teacher after acting in a certain way may decide to imitate such behavior to win similar rewards. Top Cognitive Views of Motivation Cognitive views stress that human behavior is influenced by the way people think about themselves and their environment. The direction that behavior takes can be explained by four influences: Piaget proposes that children possess an inherent desire to maintain a sense of organization and balance in their conception of the world equilibration. A sense of equilibration may be experienced if a child assimilates a new experience by relating it to an existing scheme, or the child may accommodate by modifying an existing scheme if the new experience is too different. In addition, individuals will repeatedly use new schemes because of an inherent desire to master their environment. This explains why young children can, with no loss of enthusiasm, sing the same song, tell the same story, and play the same

game over and over and why they repeatedly open and shut doors to rooms and cupboards with no seeming purpose. It also explains why older children take great delight in collecting and organizing almost everything they can get their hands on and why adolescents who have begun to attain formal operational thinking will argue incessantly about all the unfairness in the world and how it can be eliminated Stipek, Top The Need for Achievement Have you ever decided to take on a moderately difficult task like take a course on astronomy even though you are a history major and have only a limited background in science and then found that you had somewhat conflicting feelings about it? On the one hand, you felt eager to start the course, confident that you would be pleased with your performance. But on the other hand, you also felt a bit of anxiety because of the small possibility of failure. Now try to imagine the opposite situation. In reaction to a suggestion to take a course outside your major, you flat out refuse because the probability of failure seems great, while the probability of success seems quite small. In the early s John Atkinson proposed that such differences in achievement behavior are due to differences in something called the need for achievement. Atkinson described this need as a global, generalized desire to attain goals that require some degree of competence. He saw this need as being partly innate and partly the result of experience. Individuals with a high need for achievement have a stronger expectation of success than they do a fear of failure for most tasks and therefore anticipate a feeling of pride in accomplishment. When given a choice, high-need achievers seek out moderately challenging tasks because they offer an optimal balance between challenge and expected success. By contrast, individuals with a low need for achievement avoid such tasks because their fear of failure greatly outweighs their expectation of success, and they therefore anticipate feelings of shame. When faced with a choice, they typically opt either for relatively easy tasks because the probability of success is high or rather difficult tasks because there is no shame in failing to achieve a lofty goal. Glasser argues that for people to succeed at life in general, they must first experience success in one important aspect of their lives. For most children, that one important part should be school. The self-worth of the remaining students who may be quite capable suffers, which depresses their motivation to achieve on subsequent classroom tasks Covington, After he graduated, however, he came into contact with Gestalt psychologists a group of German psychologists whose work during the s and s laid the foundation for the cognitive theories of the s and s , prepared for a career as a psychoanalyst, and became interested in anthropology. As a result of these various influences, he came to the conclusion that American psychologists who endorsed the behaviorist position had become so preoccupied with overt behavior and objectivity that they were ignoring other important aspects of human existence hence the term humanistic to describe his views. When Maslow observed the behavior of especially well-adjusted persons--or self-actualizers, as he called them--he concluded that healthy individuals are motivated to seek fulfilling experiences. Referring to need gratification as the most important single principle underlying all development, he adds that "the single, holistic principle that binds together the multiplicity of human motives is the tendency for a new and higher need to emerge as the lower need fulfills itself by being sufficiently gratified" , p. He elaborates on this basic principle by proposing a five-level hierarchy of needs. Physiological needs are at the bottom of the hierarchy, followed in ascending order by safety, belongingness and love, esteem, and self-actualization needs. This order reflects differences in the relative strength of each need. The first four needs physiological, safety, belongingness and love, and esteem are often referred to as deficiency needs because they motivate people to act only when they are unmet to some degree. Self-actualization, by contrast, is often called a growth need because people constantly strive to satisfy it. For example, an individual who felt she had the capability to write novels, teach, practice medicine, and raise children would not feel self-actualized until all of these goals had been accomplished to some minimal degree. Because it is at the top of the hierarchy and addresses the potential of the whole person, self-actualization is discussed more frequently than the other needs. Maslow originally felt that self-actualization needs would automatically be activated as soon as esteem needs were met, but he changed his mind when he encountered individuals whose behavior did not fit this pattern. He concluded that individuals whose self-actualization needs became activated held in high regard such values as truth, goodness, beauty, justice, autonomy, and humor Feist, In addition to the five basic needs that compose the hierarchy, Maslow describes cognitive needs such as the needs to know and to understand and aesthetic needs such as the needs for order, symmetry, or harmony.

While not part of the basic hierarchy, these two classes of needs play a critical role in the satisfaction of basic needs. Maslow maintains that such conditions as the freedom to investigate and learn, fairness, honesty, and orderliness in interpersonal relationships are critical because their absence makes satisfaction of the five basic needs impossible. Imagine, for example, trying to satisfy your belongingness and love needs or your esteem needs in an atmosphere characterized by dishonesty, unfair punishment, and restrictions on freedom of speech.

Top The Impact of Cooperative Learning on Motivation Classroom tasks can be structured so that students are forced to compete with one another, work individually, or cooperate with one another to obtain the rewards that teachers make available for successfully completing these tasks. Traditionally, competitive arrangements have been assumed to be superior to the other two in increasing motivation and learning. In this section we will describe cooperative-, competitive, and individual learning arrangements sometimes called goal structures or reward structures, identify the elements that make up the major approaches to cooperative learning, and examine the effect of cooperative learning on motivation, achievement, and interpersonal relationships. Types of Classroom Reward Structures Competitive goal structures are typically norm referenced. This traditional practice of grading on the curve predetermines the percentage of A, B, C, D, and F grades regardless of the actual distribution of test scores. Some researchers have argued that competitive reward structures lead students to focus on ability as the primary basis for motivation. This orientation is reflected in the question "Am I smart enough to accomplish this task? Individualistic goal structures are characterized by students working alone and earning rewards solely on the quality of their own efforts. The success or failure of other students is irrelevant. All that matters is whether the student meets the standards for a particular task Johnson et al. Thirty students working by themselves at computer terminals are functioning in an individual reward structure. According to Carole Ames and Russell Ames, individual structures lead students to focus on task effort as the primary basis for motivation as in "I can do this if I try". Whether a student perceives a task as difficult depends on how successful she has been with that type of task in the past. Cooperative goal structures are characterized by students working together to accomplish shared goals. What is beneficial for the other students in the group is beneficial for the individual and vice versa. Because students in cooperative groups can obtain a desired reward such as a high grade or a feeling of satisfaction for a job well done only if the other students in the group also obtain the same reward, cooperative goal structures are characterized by positive interdependence. For example, a teacher might present a lesson on map reading, then give each group its own map and a question-answering exercise. Students then work with each other to ensure that all know how to interpret maps. Each student then takes a quiz on map reading. All teams whose average quiz scores meet a preset standard receive special recognition Johnson et al. Cooperative structures lead students to focus on effort and cooperation as the primary basis of motivation. This orientation is reflected in the statement "We can do this if we try hard and work together. William Glasser, whose ideas we mentioned earlier, is a fan of cooperative learning. He points out that student motivation and performance tend to be highest for such activities as band, drama club, athletics, the school newspaper, and the yearbook, all of which require a team effort Gough, We would also like to point out that cooperative-learning and reward structures are consistent with the constructivist approach discussed in Chapters 1, 2, and 10 since they encourage inquiry, perspective sharing, and conflict resolution.

Top Suggestions for Teaching in Your Classroom: Motivating Students to Learn 1. Use behavioral techniques to help students exert themselves and work toward remote goals. Make sure that students know what they are to do, how to proceed, and how to determine when they have achieved goals. Do everything possible to satisfy deficiency needs -- physiological, safety, belongingness, and esteem. Accommodate the instructional program to the physiological needs of your students. Make your room physically and psychologically safe. Show your students that you take an interest in them and that they belong in your classroom.

**Chapter 3 : Classics in the History of Psychology -- A. H. Maslow ( ) A Theory of Human Motivation**

66 *Mathematical Modelling of Human Motivation: A Vector Hypothesis Modelaci3n matem3tica de la motivaci3n humana: una hip3tesis vectorial Ivan Kotliarov1 www.nxgvision.com (in Econometrics), www.nxgvision.com (in Human Resource Management), Saint-Petersburg University of Economics and Engineering, Russia.*

George Massey University, New Zealand Athabasca University, Canada Abstract Existing research into motivation in online environments has tended to use one of two approaches. The first adopts a trait-like model that views motivation as a relatively stable, personal characteristic of the learner. Research from this perspective has contributed to the notion that online learners are, on the whole, intrinsically motivated. The alternative view concentrates on the design of online learning environments to encourage optimal learner motivation. Neither approach acknowledges a contemporary view of motivation that emphasises the situated, mutually constitutive relationship of the learner and the learning environment. Using self-determination theory SDT as a framework, this paper explores the motivation to learn of preservice teachers in two online distance-learning contexts. In this study, learners were found to be not primarily intrinsically motivated. Instead, student motivation was found to be complex, multifaceted, and sensitive to situational conditions. The growth of the Internet and related technologies has resulted in a merging of online teaching and learning into the routine practices of universities. At the same time, it has given distance education a new appeal Tallent-Runnels et al. Following Bates , online learning is viewed here as a subcategory of distance education that specifically uses the Internet and the World Wide Web. Online learning has a number of potential benefits, not least of which is the ability to overcome the temporal and spatial restrictions of traditional educational settings Bates, Freedom from constraint may also be seen as a defining feature of distance learning, for example freedom of content, space, medium, access Paulsen, , and relationship development Anderson, Motivation is one such factor Bekele, Motivation can influence what we learn, how we learn, and when we choose to learn Schunk, Research shows that motivated learners are more likely to undertake challenging activities, to be actively engaged, to enjoy and adopt a deep approach to learning, and to exhibit enhanced performance, persistence, and creativity see Schunk et al. Studies that explore motivation to learn in online contexts are relatively limited both in number and scope Artino, ; Bekele, Existing research has had a tendency to adopt a limited view of motivation that does not acknowledge the complexity and dynamic interplay of factors underlying and influencing motivation to learn Brophy, Instead, designing motivating learning environments has received attention ChanLin, ; Keller, More frequently, motivation has been viewed as a personal characteristic that remains relatively stable across contexts and situations. While intrinsic motivation may influence initial engagement as well as retention in online study, research that treats intrinsic and extrinsic motivation as a dichotomy may present an overly simplistic view of both contextual effects and motivation itself. Together, these factors point to the need to reconsider motivation to learn in technology-mediated environments. Self-Determination Theory SDT As suggested by Miltiadou and Savenye , studies of motivation in online learning environments have adopted various frameworks to underpin their research e. Self-determination theory is a contemporary theory of situated motivation that is built on the fundamental premise of learner autonomy. SDT argues that all humans have an intrinsic need to be self-determining or autonomous i. SDT explains extrinsic motivation processes in terms of external regulation as the reasons for undertaking the task lie outside the individual. However, the degree to which an activity is perceived as externally controlled can vary, and therefore different types of extrinsic motivation exist. This model conceptualises a continuum of regulation that ranges from amotivation lack of motivation at one end to intrinsic motivation at the other. Between these, there exist different types of extrinsic motivation that vary in the degree to which externally motivated behaviour is autonomously determined i. According to the taxonomy, amotivated individuals lack motivation or intention to act. Beyond this, extrinsic motivation and intrinsic motivation have often been treated as a dichotomy, especially in earlier research see Schunk et al. Within the continuum of human motivation, however, four patterns of extrinsic motivation are identified. External regulation is the type of extrinsic motivation most often contrasted with intrinsic motivation, where

individuals are responsive to threats of punishment or the offer of rewards and tend to be compliant as a result. Introjection refers to students who engage in a task because they feel they should due to the expectations of others. Identified regulation is associated with individuals who engage in an activity because the results may have personal value to them or because the activity is regarded as worthwhile. Regulation is internal in the sense that the individual has chosen the goal or identifies with it and is aware of its importance. Identified regulation is considered particularly important from a practical viewpoint because the perceived relevance and worthwhileness of learning activities can be influenced by the choices made by teachers and course designers Brophy, Integration is the final and most autonomous type of extrinsic motivation, where learners engage in the activity because of its significance to their sense of self. Figure 1 shows the elements of the SDT model, described above, that form the basis of the scale used to measure motivation in this investigation. Here, the focus is on the external regulation and identified regulation aspects of extrinsic motivation, as well as on amotivation and intrinsic motivation. The placement of intrinsic motivation on the far right is not intended to suggest that extrinsic motivation can shift to intrinsic motivation as this depends on the intrinsic interest of the activity to the individual. Studies that have adopted this framework are few but starting to appear Martens et al. However, one notable limitation of these studies has been the tendency to focus only on intrinsic motivation. In doing so, the power of the model to explore a broader range of motivation, particularly more autonomous types of extrinsic motivation, has been neglected. This is important because previous research in face-to-face contexts Lepper et al. This paper presents findings of one aspect of a larger study Hartnett, that explored the motivation of preservice teachers situated within two separate and different online distance-learning contexts, using SDT to underpin the investigation. Results presented here address the question, What is the nature of motivation to learn in online contexts? Research Method Case Studies Case-study methodology was used to explore the complex phenomenon of motivation in a manageable way to advance understanding Yin, Purposive sampling methods Patton, were used to select two information-rich cases. Therefore, potential cases were identified from the same programme within the same institution in order to reduce differential contextual influences at the institutional level. Cases were chosen based on predetermined criteria of importance to ensure relevance to the research question Patton, In particular, 1 courses were required to be predominantly web-based, with only limited resources provided by alternative methods, such as print; and 2 course expectations required students to participate within the online learning community as an integral part of assessed coursework. Procedures Preceding the collection of data, ethical consent to undertake the study was obtained. Data collection procedures comprised online questionnaires, interviews, archived online data including online asynchronous discussion transcripts and usage statistics, achievement data, and course resources. Findings presented here draw on a subset of the data collected via the online questionnaires that were administered after the relevant learning activities had been undertaken. The questionnaire contained three sections: The self-report motivation data is the focus here. Motivation Measure Learner motivation was measured using the self-report situational motivational scale SIMS developed by Guay, Vallerand, and Blanchard, which operationalises elements of the SDT continuum described earlier see Figure 1. It measures situational intrinsic motivation, extrinsic forms of motivation external regulation and identified regulation, and amotivation. Participants were asked to respond to these questions in relation to a specified assignment, and its associated online activities, within each course. Each of the four motivation subtypes was measured using 7-point Likert scales, with four questions for each motivation subscale. For each participant, these subscale scores were then used to calculate a single motivation score called the self-determination index SDI. Data Analysis Yin argues that while qualitative methods and data remain central in case-study research, quantitative data and analysis can add to the overall picture of the case. This is the perspective adopted throughout the investigation described here. Nonparametric statistical calculations were performed because of the small sample size within each case study and the inclusion of ordinal scores in the SIMS motivation scale Guay et al. Context and Participants The two courses that provided the context for the case studies were situated within the larger context of a preservice teacher education programme at a New Zealand tertiary institution. Students in this programme were preparing to teach in New Zealand primary i. These courses were considered Internet-based rather than fully online because students received some print

material study guide in both case studies and digital resources CD-ROM in case study one at the beginning of their course. The online learning platform used was the WebCT learning management system. The boundary for each case study centred on one assignment and its associated online activities. In both case studies, all participants had similar prior experience of online learning and group assignments. While both cases were chosen from courses within the same programme, the instructional design of each was different. Case study one was situated within a compulsory integrated science and technology course. Teaching staff consisted of a course coordinator with science expertise and a tutor with technology expertise. The tutor was responsible for the majority of the online teaching. Students typically took this course in the third and final year of their degree. This was undertaken over a six-week period in which students were required to work collaboratively in small groups. Case study two was positioned within an introductory social studies curriculum course that formed a compulsory component of the same programme. Students usually took this course in the second year of their degree. An individual microteaching and reflection assignment with associated online activities, which required students to plan and teach two consecutive lessons in a school of their choice and then reflect on their experience, formed the boundary for case study two. The course coordinator was responsible for all online teaching throughout the semester. A total of 21 student participants took part in the two case studies 12 in case study one and 9 in case study two and were recruited from the semester one February–June online distance offering of each course. Participants were located throughout New Zealand and undertook their courses at a distance from the main campus. The respondent group, matching the general demographics of the courses, comprised 2 males and 19 females 1 male in each case study. We should emphasise that the information and statistical data reported here are included to enrich the wider study and explicate the findings. This was a qualitative study to discover whether and what kind of different motivations existed in these learners, not to generalise to the wider population of online learners. With half of the case study one participants having positive SDI scores and half having negative scores, it is apparent that the nature of motivation to learn is diverse among this group. For those with positive SDI scores, in general, more internalised forms of motivation, namely identified regulation IR and intrinsic motivation IM, were prominent. This indicates that these participants perceived the activity to be worthwhile and valuable an indicator of identified regulation and interesting or enjoyable an indicator of intrinsic motivation to some degree. Conversely, learners with negative SDI scores generally reported experiencing more externalised forms of motivation. These included external regulation ER, signifying they were complying with external demands, and amotivation AM, indicating they lacked motivation due to a perceived lack of relevance or competence. Furthermore, several of the participants also reported a high degree of amotivation. In other words, participants did not exclusively report only one motivation subtype. All participants had positive SDI scores ranging from 16 to 24. As with case study one, those participants with the highest SDI scores tended to report higher levels of identified regulation IR and intrinsic motivation IM and lower external regulation ER scores. Almost all participants reported low amotivation scores a contributing factor to the positive SDI scores. Turning to the subscale results, the low amotivation scores indicate that participants found value in the task and felt reasonably competent in undertaking it. The value, relevance, and importance of the task to participants is high. But identified regulation was not the only motivation subtype that was strongly endorsed by this group.

## Chapter 4 : Mentoring Minds | Critical Thinking for Life!

*Human motivation (understood as a person 's state that defines degree and o r i e n t a t i o n of ac t i v i t y of a person in a given situation) is determined by.*

Thompson Teaching Motivating students is a complicated business no matter what age they may be. When students want to complete their work and want to succeed, things will go well in your classroom—they will learn and you will have a rewarding day at school. Here are ten very brief ideas that I find useful in my teaching practice. All learning must have a purpose. I have rarely met a student who wanted to work just for the sake of working. Students need the skills and knowledge necessary to complete their work and achieve their goals. Help students achieve short-term goals to develop the competencies they need to be successful. Keeping binders in order, learning to listen carefully, paying attention—these are just some of the skills that students need to make learning accessible. Specific directions empower students. When students know exactly what they must do to complete assignments, they will approach their work with confidence and interest. Giving good directions is an art form. Keep them simple, brief, and logical. Students want to have fun while they work. Teachers who offer enjoyable learning activities find that students are less likely to be off task. Teachers also want to have fun when they work! Certification Requirements for U. Offer activities that involve higher-order thinking skills. Students find open-ended questions and critical thinking more engaging than activities involving just recall of facts. Rote drills do have a place in any learning environment, but few kids are really inspired by them. Work that requires higher-level thinking skills will move your students in the right direction. Curiosity is an important component of motivation. When students want to learn more about a topic, they will tackle challenging assignments in order to satisfy their curiosity. Even something as simple as asking a provocative question to get students thinking in a new way can spark curiosity. A blend of praise and encouragement is effective in building self-reliance. Teachers who offer sincere praise and encouragement establish a positive, nurturing classroom atmosphere. When students know that they are on the right track, they will want to continue. A combination of extrinsic and intrinsic rewards increases student focus and time on task behavior. When used separately, both types of rewards motivate students. However, when teachers combine them, the effect is much greater. Involve students in collaborative activities. When students work together, motivation and achievement both soar. Students tend to work harder when they believe that their teacher likes them. This is probably the most important principle of motivation. Why should students work for a grouchy teacher? If your students know that they matter to you, then they will be much more inclined to stay on task than if they believe that you are not invested in their success.

**Chapter 5 : Mathematics Quotes ( quotes)**

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Seven Principles During the last four decades, scientists have engaged in research that has increased our understanding of human cognition, providing greater insight into how knowledge is organized, how experience shapes understanding, how people monitor their own understanding, how learners differ from one another, and how people acquire expertise. From this emerging body of research, scientists and others have been able to synthesize a number of underlying principles of human learning. This growing understanding of how people learn has the potential to influence significantly the nature of education and its outcomes. Our appraisal also takes into account a growing understanding of how people develop expertise in a subject area see, for example, Chi, Feltovich, and Glaser, ; NRC, b. Understanding the nature of expertise can shed light on what successful learning might look like and help guide the development of curricula, pedagogy, and assessments that can move students toward more expert-like practices and understandings in a subject area. The design of educational programs is always guided by beliefs about how students learn in an academic discipline. Whether explicit or implicit, these ideas affect what students in a program will be taught, how they will be taught, and how their learning will be assessed. Thus, educational program designers who believe students learn best through memorization and repeated practice will design their programs differently from those who hold that students learn best through active inquiry and investigation. The model for advanced study proposed by the committee is supported by research on human learning and is organized around the goal of fostering Page Share Cite Suggested Citation: The National Academies Press. Learning with understanding is strongly advocated by leading mathematics and science educators and researchers for all students, and also is reflected in the national goals and standards for mathematics and science curricula and teaching American Association for Advancement of Science [AAAS], , ; National Council of Teachers of Mathematics [NCTM], , , ; NRC, The committee sees as the goal for advanced study in mathematics and science an even deeper level of conceptual understanding and integration than would typically be expected in introductory courses. Guidance on how to achieve learning with understanding is grounded in seven research-based principles of human learning that are presented below see Box These principles also serve as the foundation for the design of professional development, for it, too, is a form of advanced learning. While it could be argued that all components of the educational system e. Although this framework was developed to assess current programs of advanced study, it also can serve as a guide or framework for those involved in developing, implementing, or evaluating new educational programs. Principled Conceptual Knowledge Learning with understanding is facilitated when new and existing knowledge is structured around the major concepts and principles of the discipline. Highly proficient performance in any subject domain requires knowledge that is both accessible and usable. A rich body of content knowledge about a subject area is a necessary component of the ability to think and 1 The research on which these principles are based has been summarized in How People Learn: Page Share Cite Suggested Citation: Learners use what they already know to construct new understandings. Learning is facilitated through the use of metacognitive strategies that identify, monitor, and regulate cognitive processes. Learners have different strategies, approaches, patterns of abilities, and learning styles that are a function of the interaction between their heredity and their prior experiences. The practices and activities in which people engage while learning shape what is learned. Learning is enhanced through socially supported interactions. Therefore, curriculum and instruction in advanced study should be designed to develop in learners the ability to see past the surface features of any problem to the deeper, more fundamental principles of the discipline. Even students who prefer to seek understanding are often forced into rote learning by the quantity of information they are asked to absorb. Prior Knowledge Learners use what they already know to construct new understandings. When students come to advanced study, they already possess knowledge, skills, beliefs, concepts, conceptions, and misconceptions that can significantly influence how they think about the world, approach new learning, and go about solving unfamiliar problems Wandersee, Mintzes, and Novak,

People construct meaning for a new idea or process by relating it to ideas or processes they already understand. This prior knowledge can produce mistakes, but it can also produce correct insights. Some of this knowledge base is discipline specific, while some may be related to but not explicitly within a discipline. Research on cognition has shown that successful learning involves linking new knowledge to what is already known. These links can take different forms, such as adding to, modifying, or reorganizing knowledge or skills. How these links are made may vary in different subject areas and among students with varying talents, interests, and abilities Paris and Ayers, Learning with understanding, however, involves more than appending new concepts and processes to existing knowledge; it also involves conceptual change and the creation of rich, integrated knowledge structures. Thus, lecturing to students is often an ineffective tool for producing conceptual change. For example, Vosniadou and Brewer describe how learners who believed the world is flat perceived the earth as a three-dimensional pancake after being taught that the world is a sphere. Moreover, when prior knowledge is not engaged, students are likely to fail to understand or even to separate knowledge learned in school from their beliefs and observations about the world outside the classroom. Effective teaching involves gauging what learners already know about a subject and finding ways to build on that knowledge. When prior knowledge contains misconceptions, there is a need to reconstruct a whole relevant framework of concepts, not simply to correct the misconception or faulty idea. Effective instruction entails detecting those misconceptions and addressing them, sometimes by challenging them directly Caravita and Hallden, ; Novak, The central role played by prior knowledge in the ability to gain new knowledge and understanding has important implications for the preparation of students in the years preceding advanced study. To be successful in advanced study in science or mathematics, students must have acquired a sufficient knowledge base that includes concepts, factual content, and relevant procedures on which to build. This in turn implies that they must have had the opportunity to learn these things. Many students, however, particularly those who attend urban and rural schools, those who are members of certain ethnic or racial groups African American, Hispanic, and Native American , and those who are poor, are significantly less likely to have equitable access to early opportunities for building this prerequisite knowledge base Doran, Dugan, and Weffer, ; see also Chapter 2 , this volume. Inequitable access to adequate preparation can take several forms, including 1 lack of appropriate courses Ekstrom, Goertz, and Rock, ; 2 lack of qualified teachers and high-quality instruction Gamoran, ; Oakes, ; 3 placement in low-level classes where the curriculum focuses on less rigorous topics and low-level skills Burgess, , ; Nystrand and Gamoran, ; Oakes, ; 4 lack of access to resources, such as high-quality science and mathematics facilities, equipment, and textbooks Oakes, Gamoran, and Page, ; and 5 lack of guidance and encouragement to prepare for advanced study Lee and Ekstrom, Students who lack opportunities to gain important knowledge and skills in the early grades may never get to participate in advanced classes where higher-order skills are typically taught Burnett, Metacognition Learning is facilitated through the use of metacognitive strategies that identify, monitor, and regulate cognitive processes. To be effective problem solvers and learners, students need to determine what they already know and what else they need to know in any given situation. They must consider both factual knowledgeâ€”about the task, their goals, and their abilitiesâ€”and strategic knowledge about how and when to use a specific procedure to solve the problem at hand Ferrari and Sternberg, In other words, to be effective problem solvers, students must be metacognitive. Empirical studies show that students who are metacognitively aware perform better than those who are not Garner and Alexander, ; Schoenfeld, For example, research demonstrates that students with better-developed metacognitive strategies will abandon an unproductive problem-solving strategy very quickly and substitute a more productive one, whereas students with less effective metacognitive skills will continue to use the same strategy long after it has failed to produce results Gobert and Clement, The basic metacognitive strategies include 1 connecting new information to former knowledge; 2 selecting thinking strategies deliberately; and 3 planning, monitoring, and evaluating thinking processes Dirkes, Experts have highly developed metacognitive skills related to their specific area of expertise. If students in a subject area are to develop problem-solving strategies consistent with the ways in which experts in the discipline approach problems, one important goal of advanced study should be to help students become more metacognitive. Having students construct concept maps 2 for a topic of study can also provide powerful metacognitive insights, especially

when students work in teams of three or more see Box for a discussion of concept maps. Differences Among Learners Learners have different strategies, approaches, patterns of abilities, and learning styles that are a function of the interaction between their heredity and their prior experiences. Individuals are born with potential that develops through their interaction with their environment to produce their current capabilities and talents. Thus among learners of the same age, there are important differences in cognitive abilities, such as linguistic and spatial aptitudes or the ability to work with symbolic quantities representing properties of the natural world, as well as in emotional, cultural, and motivational characteristics. Additionally, by the time students reach high school, they have acquired their own preferences regarding how they like to learn and at what pace. Thus, some students will respond favorably to one kind of instruction, whereas others will benefit more from a different approach. Annex illustrates some of the ways in which curriculum and instruction might be modified to meet the learning needs of high-ability learners. Appreciation of differences among learners also has implications for the design of appropriate assessments and evaluations of student learning. Students with different learning styles need a range of opportunities to demonstrate their knowledge and skills. For example, some students work well

2 Concept maps are two-dimensional, hierarchical representations of concepts and relationships between concepts that model the structure of knowledge possessed by a learner or expert. The constructivist epistemology underlying concept maps recognizes that all knowledge consists of concepts, defined as perceived regularities in events or objects or their representation, designated by a label, and propositions that are two or more concepts linked semantically to form a statement about some event or object. Free software that aids in the construction of concept maps is available at [www](http://www). Figure was made at the beginning of the study of meiosis and shows that the student did not know how to organize and relate many of the relevant concepts. The student equated meiosis with sexual reproduction and was not clear on how meiosis relates to homologous chromosomes. These maps are presented without editing. The student now has integrated the meanings of meiosis and sexual reproduction, homologous chromosomes, and other concepts. While some concept meanings still appear a bit fuzzy, the student has clearly made progress in the development of understanding, and his knowledge structure can serve as a good foundation for further study. Some excel at recalling information, while others are more adept at performance-based tasks. Some express themselves well in writing, while others do not. Humans are motivated to learn and to develop competence

Stipek, ; White, Motivation can be extrinsic performance oriented , for example to get a good grade on a test or to be accepted by a good college, or intrinsic learning oriented , for example to satisfy curiosity or to master challenging material. Intrinsic motivation is enhanced when learning tasks are perceived as being interesting and personally meaningful and are presented at the proper level of difficulty. A task that is too difficult can create frustration; one that is too easy can lead to boredom. Some beliefs about learning are quite general. For example, some students believe their ability to learn a particular subject or skill is predetermined, whereas others believe their ability to learn is substantially a function of effort Dweck, Believing that abilities are developed through effort is most beneficial to the learner, and teachers and others should cultivate that belief Graham and Weiner, ; Weiner, A belief in the value of effort is especially important for students who are traditionally underrepresented in advanced study. Several recent studies document the power of a high school culture that expects all students to spend time and effort on academic subjects and is driven by a belief that effort will pay off in high levels of academic achievement for everyone, regardless of prior academic status, family background, or future plans. In such settings, remediation of skill deficits takes on a different character, teachers are able and willing to provide rigorous academic instruction to all students, and all students respond with effort and persistence Bryk, Lee, and Holland, ; Lee, ; Lee, Bryk, and Smith, ; Lee and Smith, ; Marks, Doane, and Secada, ; Rutter, Situated Learning The practices and activities in which people engage while learning to shape what is learned. Research on the situated nature of cognition indicates that the way people learn a particular domain of knowledge and skills and the context in which they learn it become a fundamental part of what is learned Greeno, ; Lave, When students learn, they learn both information and a set of practices, and the two are inextricably related. Because the practices in which students engage as they acquire new concepts shape what and how the students learn, transfer is made possible to the extent that knowledge and learning are grounded in multiple contexts Brown, Collins, and Duguid, Transfer is more difficult when a

concept is taught in a limited set of contexts or through a limited set of activities. When concepts are taught only in one context, students are not exposed to the varied practices associated with those concepts. It is only by encountering the same concept at work in multiple contexts that students can develop a deep understanding of the concept and how it can be used, as well as the ability to transfer what has been learned in one context to others Anderson, Greeno, Reder, and Simon, If the goal of education is to allow learners to apply what they learn in real situations, learning must involve applications and take place in the context of authentic activities Brown et al. Brown and colleagues , p. Brown and colleagues offer a somewhat different definition: Regardless of which definition is adopted, the importance of situating learning in authentic activities is clear. Collins notes the following four specific benefits: Teachers can engage learners in important practices that can be used in different situations by drawing upon real-world exercises, or exercises that foster problem-solving skills and strategies that are used in real-world situations.

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