Thursday, 15 March 2007

Educational Psychology

Take-home Midterm:

IB: Explain the "nature-nurture controversy" and describe its influence on education and the general culture.

During the formation of psychology as a field of study, there were two independent and mutually exclusive positions regarding human development. Those two positions were comprised of the 'nature' activists (also known as hereditarians), who believed that human traits were predetermined before birth, and the 'nurture' activists (also known as environmentalists), who contrapositively believed that humans developed throughout the lifespan via environmental influences and learning. Hypothetically, if occupational success was the trait being investigated, the nature activists, like Henry Goddard, would argue that humans are either born with the capacity for being successful or they are not. Nurture activists like John Watson, on the other hand, would argue that all humans can be successful through learning and experiencing a positively stimulating environment. The hereditarians and environmentalists, therefore, rarely agreed on any issue relating to human development, causing a great internal schism within the field.

This divide between extreme positions had significant effects not only on education, but also on the general culture of the United States. Firstly, the hereditarian viewpoint—with its overly deterministic perspective—offered a rather negative and bleak projection for humanity, and even more so to the educational system. Henry Goddard did a case study on the Kallikak family, in which he irrationally concluded that genetic endowment perpetuated itself throughout forthcoming generations. He 'argued' (and I use the term *very* loosely) that all the descendants of Martin Kallikak's legitimate wife were intelligent, successful businessmen, while the offspring of his illegitimate lover were unintelligent delinquents. The US government utilized his 'conclusion' (again, used loosely), declaring that anyone below Goddard's coined 'moron' level should be sterilized so that their bad endowment wouldn't perpetuate through their offspring. Further, if intelligence is completely genetically predetermined, as Goddard suggested, then there really isn't any need for formal education, since children won't learn past their hereditary capacity anyway. Such an outlook is quite unfortunate for anyone going into the field of education.

Secondly, the environmentalist viewpoint—with little to no regard for genetic predispositions—offered a drastically more positive and reassuring outlook for humanity, especially with regards to formal education. John Watson did the now-famous Baby Albert study in which he used classical conditioning to pair a neutral stimulus (a white rat) with fear (caused by an unconditioned stimulus of a loud noise). Albert quickly learned to fear the white rat because of its association with the loud noise. Through this study, and those of other behaviourists, the argument was made that humans could develop through external stimuli within their environment. The learning theorists took the behavioural perspective one step further by applying this concept of development via external stimuli to intelligence. They said that people could learn and develop their intelligence through active mental exercises, such as those offered in formal education. This theory counteracted Goddard's hereditarian perspective, and was much more appealing to the American public, considering the field of genetics was weak at best at the time. It also offered a much more positive outlook on education, in that since people could 'learn,' teachers could, in fact, make a difference in a child's intelligence.

Within contemporary psychology, however, these two extreme viewpoints have essentially faded out of existence. More commonly, psychologists will assume a role that is the synthesis of the two extreme perspectives. By the masses assuming such a role, a single rule of Educational Psychology formed: all human traits are the result of the interaction between genetic propensities and the environment, particularly during respective critical periods. This law carries with it the idea that both genetic aspects and environmental aspects impact human development.

II: Explain to a group of junior high school students HOW a novice student becomes an expert learner.

Alright guys, today we're going to discuss something that I'm sure will make you all very happy: how to get better grades *and* cut down the time you spend on homework. Would you agree that those are two things you'd like to accomplish? I know I don't like spending a lot of time on homework, but at the same time, I didn't like hearing my parents fuss over a bad grade.

To reach this goal of less homework time and better grades, we all have to become expert students. If you think you're spending too much time working on homework and you're not getting the grades that you'd like, you might not be quite to the 'expert' level...yet. You might be asking yourselves, what do experts students do differently than "regular" students? Well, there are four main things that expert students do differently.

First, they organize the knowledge they already have and newly learned information in efficient and insightful ways. What do I mean by efficiency? I mean that while a novice student may remember new information, he or she doesn't organize it in memory in any meaningful way. Expert students organize new information based on how it related to solving a problem. For instance, if you were learning multiplication and figured out that it was essentially just a quicker way to add numbers, you would remember it better right? You've organized that knowledge by realizing that if given the problem 4+4+4+4+4, you can make it easier by just doing 4x5. So, being able to organize new information based on how it will help you solve a problem is more efficient than just keeping it in memory.

Expert students also actively choose what they remember. As I'm standing here talking to you, do you think it is better to try and take down every word I say, or just to write down the important parts? It's much more efficient to write down the important stuff in your notes. That way you don't have to review as much information before the test or to do the homework. By remembering just the important parts, expert students also can more easily compare new problems to ones they've already had. If you can remember how you solved a previous problem that is *similar* to the new one, it will give you insight into solving the new problem.

Second, experts go about solving problems differently than do novices. While novices look at problems in little chunks, the experts try to see the 'big picture' first, and then break it down into smaller parts. So, the expert always has the end result in mind—what was the original problem that I was trying to solve? Experts also plan very carefully before trying to solve a problem. A novice student will look at a new problem and just jump right in without considering possible ways to solve it; experts take more time planning. Experts do one other important thing when problem solving; they monitor their progress. What the heck does that mean? That means that as they're working on a problem, they look back and see if what they're doing is working or not. If their strategy isn't working out for that particular problem, they stop and try something new.

Third, expert students use a variety of learning strategies in order to remember new information. By strategies I mean different ways to make memorization easier. Some of these strategies are clustering or chunking, acronyms, and association. Clustering and association are very common strategies. Clustering would be if I gave you a list of things to get at the grocery store and you grouped them based on where you'd find them in the supermarket—dairy, meat, vegetables, and so on. Association is where you learn a new topic and you remember it based on something you already know. That addition and multiplication example we talked about earlier would be association. You can also use use acronyms to remember things. For example, if you're in science class and need to memorize the optical spectrum, you can easily remember it by writing down ROY G. BIV, like a name. Those letters each stand for one of the colors in the spectrum: red, orange, yellow, green, blue, indigo, violet. Experts don't only use these strategies, but they also monitor them to make sure they're working. If they aren't, they try a different one.

Last, experts have a few personality traits that help them to expand their learning even more. All of the other things we've talked about were *skills*, and these are more like *attitudes*. One big difference in attitude is that novices really just do the work to earn the grade, while experts do the work so they will have a better understanding of something new. Ask yourself that the next time you're doing an assignment; am I just worried about the grade or do I really want to learn something new? Experts also have high self-efficacy. That is a word you might not be familiar with, but it just means they believe they can accomplish something. If you have high self-efficacy, you believe that you *can* complete an assignment, project, or whatever you're working on. You also take responsibility for your own actions. So, if you get a test back and you earned a C+, you don't shrug it off and say “eh, it was too hard.” Rather, you say something like “well, I just needed to study more.” One last attitude is one of—I know, another big word—volition. That simply means that you take a project to completion instead of giving up somewhere along the way.

So, today we've seen four different ways that we can become expert students, right? You can organize new information more efficiently, use more effective problem-solving strategies, monitor the usefulness of a particular strategy, and change your attitude about your purpose in school. By working on each of those things, you can definitely become an expert student, which will give you better grades and, in the end, cut down on your homework time. We'll be spending more time on this topic throughout the year.

III: Explain the difference between learning and thinking.

Often in the field of education, professionals will use the terms learning and thinking interchangeably. While these terms are related to one another, they *are* distinct concepts. According to Sternberg, learning is “any relatively permanent change in the behaviour, thoughts, or feelings of an organism that results from experience” (2002, p. 232). This definition separates learning from its solely academic sense; it encompasses behavioural changes, unwritten social laws regarding appropriateness, and even applying different attitudinal coping mechanisms in order to change one's outlook on a particular situation. In contrast, thinking is defined as being the “representation[s] and processing of information in the mind” (Sternberg, 2002, p. 308). Thinking, then, is a way of encoding, storing, and later retrieving information in a way which is applicably useful to solve a problem.

Both thinking and learning have various components that establish and perpetuate their uniqueness within the broader field of education. Learning can easily be broken down into four separate methodologies: classical conditioning, operant conditioning, social learning theory, and the cognitive-behavioural approach; each of which have their own learning components. Classical and operant conditioning both fall under the umbrella psychological school of behaviourism.

First, classical conditioning involves pairing a neutral stimulus (that is, one that doesn't elicit the desired response) and pairing it with an unconditioned stimulus (UCS)--and consequently, an unconditioned response [UCR]--in order to forge a link between the neutral stimulus (NS) and the desired response (also known as the conditioned response [CR]). While this is a type of learning, it isn't typically used in the field of education, but rather in neutralizing a previously-conditioned response.

Second, operant conditioning is used more often than is classical conditioning in an academic setting. It involves using reinforcement or punishment to either increase or decrease, respectively, the occurrence of a certain behaviour. Reinforcers can be positive—giving something nice—or negative—taking away something aversive. Punishments are simply the contrapositive therein. In operant conditioning, when a particular behaviour is desirable, that behaviour should be reinforced. There are many different schedules of reinforcement which are used to establish conditioning, and then to later perpetuate the behaviour.

Third, social learning theory is simply summarized as learning through watching someone model a particular behaviour and witnessing the consequence. For instance, if a child sees an adult receiving a reward for playing violently with a doll (referencing the infamous Bandura study), the child will attempt to mimic that action in order to receive the same reward. It follows, then, that a child will try to not imitate an activity for which they see the adult being punished.

Last, the cognitive-behavioural approach to learning looks more at the internal mental processes that occur between certain stimuli and a given response. While this approach is somewhat more biological in nature, it doesn't discredit environmental influence and variability. All of these theories and practices are related to the concept of learning, not thinking.

Thinking, like learning, has its own unique set of components. Those components can be easily understood as an algorithmic series of four steps: concept formation, reasoning, problem solving, and transfer. First, concept formation involves the vocabulary of a certain topic. If one doesn't understand the terminology that is used within a field of study or about a certain topic, then it is difficult to move onto the next step. For instance, if the topic is animals and one doesn't know the terms “cat,” “mammal,” or “reptile”, then it will be difficult to effectively think about the subject.

Second, deeper thinking requires an understanding of reasoning and logic. Reasoning can be either deductive—drawing specific conclusions from a set of general observations or premises—or inductive, which attempts to make a generalization from a set of specific details. Deductive reasoning is more often used in an academic setting, especially during paper writing. When a student writes a paper starting with a thesis and then provides evidence to back up the claim, he or she is using deductive reasoning. Without an understanding of how two or more premises relate to one another (logical reasoning), it would be quite difficult to move from one concept to another in an easily understandable fashion.

Third, problem solving is the application component of the thinking process. It involves utilizing the information either deduced or induced from reasoning in order to come up with a solution to a particular problem or dilemma. In this step, a student will take what he or she already knows and attempt to effectively use learning strategies to answer the question at hand.

Last, transfer refers to taking the knowledge acquired from previous problem-situations and applying it to new scenarios. For instance, if a child learns about the process of photosynthesis, the goal is that he or she will be able to apply that knowledge to reports, projects, and discussions later on in his or her academic career.

All of the above examples showed how learning and thinking are important to students, but both concepts are also incredibly important for teachers as well. Teachers need to be able to look at a student's work and analyze where mistakes are made. Being able to emulate the child's thinking and check for logical flaws or other errors will allow the teacher to be more effective in correcting problems. For instance, if a teacher can look at a kid's math homework and see that they are always multiplying instead of dividing, that problem can be easily addressed. Analytically thinking through a child's work also requires aspects of learning. A teacher won't even know to look for errors if he or she hasn't witnessed the benefits therein. Therefore, thinking and learning are both important concepts for students and teachers alike.

Though there are many differences between learning and thinking, they are also interconnected. Thinking in a way can be seen as a subset of learning. People learn new concepts by analytically thinking through them. This aloof adage is much more easily understood with a concrete example. In the process of learning about the unwritten social laws of communication, one has to analytically think (make mental representations) about the concepts being witnessed in order to later apply them. For instance, if appropriate volume in a conversation is the focus of the lesson, the child has to use the steps of thinking, starting with concept formation (i.e. Understanding the terms “volume” and “conversation”) and on through transferring that newly acquired knowledge to practical social situations that might occur on, say, the playground later on that day.

IV: Case study.

The children in this particular case study claimed that they understood the concept about which they had just been taught—vision being a result of light bouncing off an object and into the eye. However, when asked to demonstrate their 'understanding,' they proved that they had *not* actually correctly learned the concept. Each of the three learning theories (cognitive, behavioural, and social learning) offer different explanations for the children's failure to comprehend the new information.

First, the cognitive theory would state that there was some error in mental processing between the stimulus and the response. This general idea can be applied in a few different ways. Primarily, the cognitive learning theorists would say that there was an error in how the children perceived, encoded, or recalled the information. Each of these three errors are equally feasible in the given situation. Considering the teacher accepted a mere head nod as proof of their understanding, the children could have simply wanted to be done with the assignment and not *truly* understood; a problem in how they perceived the lesson. They could have also perceived it correctly, but incorrectly encoded it in their memory. For instance, they might have recognized that the light bounced off the house, but not actively tried to retain that within memory. Therefore, the next day, the newly acquired understanding wouldn't be easily recalled. The last possibility is that they had encoded the information properly, but for some reason or another (anxiety or stress for example) had trouble retrieving it when asked to do so the next day. All of these problems might stem from the lack of repetition; the students weren't given a chance to apply their new knowledge during the lesson.

Second, the behaviourists might suggest that the failure occurred because of insufficient operant conditioning. The children might not have had the motivation to actively remember the lesson since they weren't aware they would be tested over the material the next day. If the teacher would have established some system of reinforcement, the students may have been more apt to put active effort into understanding and, consequently, remembering the information from the lesson.

Third, the social learning theorists may offer lack of modeling as the reason for failure to understand. For instance, they might say that the teacher didn't explain the new concept in enough varying ways to ensure that each child had a firm grasp on it. From the scenario, it can't be ascertained that the teacher even went over the concept more than once. Also, it might have been more effective if the teacher had actually done a 'live' example. That is, the teacher could have drawn the picture on the board, and then drawn the arrow illustrating the light path, or better yet, gotten the students' ideas before giving the answer.

The three learning theories don't simply have differing viewpoints about the failure to comprehend the new concept, but each theory would also suggestions to improve recall the next day. First, the cognitive theorists would say that the teacher should check for understanding periodically throughout the lesson and implicitly encourage the students to use different learning strategies. For instance, if the teacher tried to associate the light path with something that the students already knew, they might have a better chance of recalling it the next day. The teacher could also encourage rehearsal by using several examples in the lesson and then having the students do draw the arrows in more examples on their own and on the board.

Second, the behaviourists might suggest that the teacher utilize both preemptive and postoperational reinforcement for the lesson. For the former, he or she should probably mention that the students will be quizzed over the information the next day. This will alert the students and urge them to ask questions for clarification of the topic if they don't understand. For the latter, the teacher could offer the negative reinforcement for the students that demonstrated correct understanding by taking away the homework assigned to the others for the purpose of solidifying understanding.

Last, the social learning theorists would say that the teacher needed to demonstrate the concept through more concrete examples. They would argue that he or she didn't *show* the entire process, but rather just illustrated part of it. That type of illustration would be fine for students with more developed abstract though processes, but not for fifth graders that have difficulty extrapolating concrete meaning from indirect forms of teaching.

REFERENCES:

All information came from a synthesis of class handout materials—of which bibliographic citations were not given —and the following source:

Sternberg, R.J., & Williams, W.M. (2002). *Educational psychology*. Boston: Allyn & Bacon.

While much information was taken from the above source, in-text citations are only used for direct quotations therein.