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Psychology of Education – Assignment 2

Shena Anglin

Psychology of Education EDU 520

Dr. L. M. Malcolm

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2. In the literature there are four basic approaches to learning, namely Behaviourist, Cognitivist, Humanist and Social/Situational. Describe one of these approaches and its impact on classroom learning and then describe some study strategies that help students learn.

Introduction

Only in the late 1800s did scientists begin to use a systematic approach, applying techniques used in the physical sciences to study and learn more about the way human beings and animals learned. Ivan Pavlov, Burrhus Frederic Skinner (B. F. Skinner), Edward Thorndike and John Watson are among the scientists who studied how human behaviour and the consequences of such behaviour are interrelated, and they are known as behaviourists. Following are some of the theories presented by these behaviourists.

The Proponents of Behavioural Learning



Ivan Pavlov

Ivan Pavlov’s studies were some of the earliest, presenting some of the most important findings of the study of how human beings and animals learned by consequences. Pavlov was born on September 14, 1849 and died on February 27, 1936.

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Pavlov and his colleagues began their research by studying dogs’ digestive process. They found that there were **unconditioned stimuli**. These were stimuli that the dogs did not need any prior training for there to be a response. They used meat powder placed near the mouth of a hungry dog to prove that the dog would salivate automatically. The salivation was referred to as an **unconditioned response**. **Neutral stimuli** was the name given to stimuli which triggered no natural or automatic response. Pavlov and his team showed how a neutral stimulus such as a bell, could become a **conditioned stimulus** when it was associated with the presence of an unconditioned stimulus. The neutral stimulus is then able to initiate the same response as the unconditioned stimulus did, because the dog associates it with the presence of meat. Classical conditioning is said to have occurred when the ringing of the bell by itself can produce salivation in the dog. This result shows how learning that the bell means that meat will follow, can trigger salivation, which was once thought to be an involuntary response.



B.F. Skinner

After Pavlov, B. F. Skinner came to the forefront of research in this area. Burrhus Frederic Skinner was born on March 20, 1904 and died on August 18, 1990. Skinner said that involuntary behaviour is less frequent than what he called operant behaviours, perhaps his most popular theory. According to Skinner operant behaviours will happen even in an environment in which an unconditioned stimulus, such as food, is not present. Skinner studied how behaviours and consequences are linked, how when associated with a favourable consequence, an individual will repeat a particular behaviour. This use of favourable and unfavourable consequences to manipulate behaviour is called **operant conditioning.** Skinner’s experimental device, became known as the **Skinner box** in which he would observe an animal’s behaviour when a particular consequence was present. Skinner observed that rats learned that when they pressed a bar in the

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box, they would receive food. Therefore, after a few accidental presses, the rat began pressing the bar often in order to receive the food. The rat started exhibiting more of the desired behaviour and less of other behaviours once he learned that pressing the bar resulted in receipt of food.

Edward Thorndike lived from August 31, 1874 to August 9, 1949 and was also a great contributor in the area of behavioural learning. Thorndike became known as the father of modern educational psychology, conducting the first major study of adults’ learning process in 1928. His study proved that adults’ learning ability declined very little as they aged, only at the rate of one percent per year after they reached the age of 35, and only on that the speed of learning declined. This brought about many changes in the way in which adults were taught, such as through group discussions, audio-visual aids, drama and case studies and adult learners actually played a more active role in their learning.



Edward Thorndike

One of Thorndike’s most famous theories is "The Identical Elements Theory of the Transfer of Training" where the quantity of behaviour that is transferred from a familiar situation to an unfamiliar one is determined by the how much the two situations have in common. This theory opposed the long held view of "Formal Discipline" (mostly discredited now). The theory stated that the human mind is made up of several powers such as reasoning, attention, judgment, and memory which are strengthened with practice. For example, the study of Latin and mathematics strengthened the reasoning and memory faculties. This is also known as the "Mental Muscle

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Approach" since he advocated that the mind was made more capable by repetition, just as one would strengthen their muscles with exercise.

Thorndike was a strong proponent of active learning and held a low opinion of lectures, He encouraged educators to let learners question phenomena and figure out answers on their own.

Thorndike agreed with Dewey's functionalism and added a stimulus-response component calling the theory **connectionist.** His study of animal behaviour and the learning process gave rise to this theory of connectionism. In fact his **law of effect** was derived from his study of cats’ behaviour as they learned to escape from puzzle boxes. The law of effect stated that when responses are followed by satisfying consequences, the responses become related to the situation and will likely be repeated when the situation arises again. This phenomenon was less likely to occur when the responses were not successful in achieving a favorable outcome, such as not escaping from the boxes. He also stated that the cats learned through a gradual process.

Thorndike’s **law of recency** stated that the most recent outcome of a behaviour determined whether it would be repeated. His **law of exercise** stated that the stimulus-response (S-R) associations become stronger with practice. Thorndike also contributed the law of readiness, stating that causing someone to do something they are not ready to do is unrewarding for that individual, but once they are ready to do so, performing the act is enjoyable and will likely be repeated. His theory of **belongingness** is also relevant to learning in that if the relationship is natural between the need of the animal or person, and the effect caused by the response, learning will be more effective. Thorndike’s theory became a requirement in education for the subsequent fifty years.

John Broadus Watson was born on January 9, 1878 and died on September 25, 1958. Under the combined influence of John Dewey, Jacques Loeb, Angell and Donaldson, John Watson was led to develop a highly descriptive, objective approach to analyzing behaviour that he would later give the name “behaviourism”. The nature of Watson’s experiments are influenced by Loeb’s experimental physiology, later leading him to establish the psychological school of behaviourism. Watson later became interested in the work of Ivan Pavlov and despite criticizing Pavlov’s work at first, eventually employed a much simpler version of Pavlov’s principles in his most notable works. Watson even used Pavlov’s conditioned reflex as the topic of his presidential address to the American Psychological Association.

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John B. Watson

It was John Watson who conducted the controversial “Little Albert” experiment which showed how the principles of classical conditioning could be applied to instill fear of a white rat into nine-month old little Albert. Later on he became a writer on child-rearing and a popular contributor to the advertising industry. He was a strong proponent of the nurture aspect of child-rearing in the nature vs. nurture debate, stating in his famous quote “give me a dozen infants, well-formed, and my own specified world to bring them up in and I’ll guarantee to take any one at random and train him to become any type of specialist I might select – doctor, lawyer, artist, merchant-chief and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors. I am going beyond my facts and I admit it, but so have the advocates of the contrary and they have been doing it for many thousands of years.” [Behaviourism (1930), p. 82]

Watson opposed Thorndike’s law of effect which preceded Skinner’s reinforcement theory saying they were too subjective.

The Influence of Behavioural Learning Theories in Education

The impact that the behavioural learning theories has had on classroom learning is that researchers observed that humans are similar to animals, and in particular other mammals, in that humans can be motivated to repeat a particular behaviour once it results in a satisfying consequence. Behavioural learning theorists made their contribution by translating the concept of rewards to encourage positive or desired behaviour to be repeated.

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We can apply the principles of behavioural learning which consists of the role of consequences such as reinforcers and punishers, to learning in our classroom in order to influence our students’ behaviour for the better.

Skinner’s work for example has made its impact on human education by using his findings from rats and pigeons to establish a set of behavioural learning principles that have been supported hundreds of ties in studies of humans and animals alike. One of the most important principles that is derived is the fact that human behaviour is modified depending on consequences of that behaviour – favourable consequences are reinforcers and unfavourable ones are punishers that deter the repetition of the behaviour. Reinforcers are consequences which are described in a number of ways depending on how they relate to the behaviour. Reinforcers strengthen behaviour and as with any consequence, we have to first prove that it has an influence on a particular individual’s behaviour. A consequence may be valued differently by different persons, but we cannot assume that it will impact all individuals in the same way.

Reinforcers that satisfy basic human needs are known as **primary reinforcers.** As a teacher, I would considered a primary reinforcer to my students, as I would meet my students’ basic need for love, care, security and affection. **Secondary reinforcers** are reinforcers that gain their value to a student by being related to a primary reinforcer or a prominent secondary reinforcer. For instance if a student’s achievement of good grades meets with the approval of a special person in the student’s life, then the performance becomes a secondary reinforcer.

Secondary reinforcers are classified into different groups as follows: social reinforcers - including smiles, praise, hugs or attention; activity reinforcers – computer time, games or toys; token reinforcers include such things as points, play money or stickers, that can be used to purchase tangible rewards. In order for secondary reinforcers to be of any value to our students we have to play the role of that very important primary reinforcer to our students. Then we will be able to use secondary reinforcement to have an enormous impact on classroom learning – provided we figure out what is valuable to our students. If students value game time with peers we can offer half hour of game time on Friday afternoons to all students who are consistently quiet while the teacher is conducting the lesson. There are myriad choices we can employ when offering students secondary reinforcement in order to encourage a desired behaviour.

Secondary reinforcers can be further broken down into two groups, positive reinforcers and negative reinforcers. Positive reinforcers are the reinforcers we use most often such as stickers, stamps or praise. Negative reinforcers are when we allow a student to be excused from an unpleasant activity when they have exhibited a desired behaviour. For example, I may excuse a student from one homework for every ten homeworks that they submit on time. Both positive and negative reinforcers, reinforce a desired behaviour to be repeated.

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One important way in which teachers can use the concept of reinforcement is called the Premack Principle. In employing this principle teachers offer students the ability to do something pleasant after completing less-favoured task. We should use reinforcers as soon as possible after the desired behaviour has been exhibited. This fact is derived from Skinner’s theory.

Another way in which we can describe a reinforcer is whether it is **intrinsic** or **extrinsic.** In many cases the reward for doing something is found in the mere pleasure of just doing the activity. This type of reinforcement is intrinsic. When a reward is given to encourage a particular behaviour that may not be exhibited without the reward, that type of reinforcer is known as extrinsic. In the classroom the teacher must be careful not to give an extrinsic reward for a task that the class would have performed anyway. This is so that students are encouraged to develop a desire and self motivation to do things just by the mere fact that it is for their own good, or because they derive pleasure from doing well or doing something because it is important and they should. The use of extrinsic reinforcers can be demotivating in many instances, because they take away from the basic human desire to just do something on her own.

Punishers in influencing behaviour are based on the same premise as reinforcement. If the “punishment” as a consequence is not viewed as unfavourable it will not act as a deterrent to an undesired behaviour. For example negative attention such as a frown from a parent or teacher is pleasurable to some children and is therefore not a punisher. There are two basic forms of punishment: **presentation punishment** and **removal punishment.** Presentation punishment is when a child is scolded in front of peers. Removal punishment is when a pleasant privilege is taken away from a child, such as having to stay in class during break time or has to stay longer at the end of the day, when everyone else gets to leave.

Punishment should however only be used where attempts at encouraging the desired behaviours have failed, and should be used as a last resort. Punishment should never be used out of frustration and should always be carefully thought-out and planned. Skinner believed that punishment could not extinguish inappropriate behaviour.

Five steps are recommended to extinguish inappropriate behaviour:

1. The first is the process of extinction. This concept applies in discouraging inappropriate behaviour. Extinction works by the withdrawal of reinforcers that have been encouraging the undesired behaviour. Students should be given a cue that the reinforcer will be discontinued. Having a warning will help extinction of the behaviour to happen more quickly. The correct **context** is important after extinction of a misbehaviour so that there is not a relapse of the inappropriate behaviour by what the current context retrieves. Factors such a physical environment come into play here.

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1. The second step is differential reinforcement, whereby certain behaviours are reinforced selectively, using three techniques. First, by rewarding decreased rates of the misbehaviour. Second, by reinforcing the absence of the misbehaviour. Third by rewarding alternate behaviours.
2. The third step in the five-step process of extinguishing an undesired behaviour is called the **response-cost** procedure and it involves the removal of a desirable stimulus. For this step to work the teacher must know of some particular items that the student values that serve as reinforcers for her. For example the student enjoys playing computer games at recess once she has behaved in class all morning. For discouraging misbehaviour the teacher may tell her that she is not allowed to play on the computer at recess.
3. The fourth step in the process of extinguishing an inappropriate behaviour is “time-out” in varying degrees of aversion ranging from a **nonseclusionary time-out** for a relatively minor offence where the student still observes other students enjoy reinforcement, to a **seclusionary time-out**. It is of vital important that attention to a student during time-out and restitutional activity be kept to a minimum. There should be no eye contact from on-looking peers and no conversation. During a seclusionary time-out the student is removed from the classroom and importantly returns to the classroom in a calm manner with no conversation with the teacher.
4. The fifth step in the process is the use of **aversive stimuli**. The first aversive stimulus is the use of **positive practice overcorrecting**, which is geared toward teaching the student the correct behaviour by repeating it many times over. It is important to remember to deliver instructions in a neutral tone of voice and that we have an adequate amount of time and staff assistance. **Negative practice-stimuli satiation** is where we have the student repeat the misbehaviour so many times that she becomes tired or satiated. Finally, to be used as an absolute last resort is **sensory insult** in which extreme strategies are used to get the child to stop the behaviour. An example of this would be suspension from school. Sensory insult must be used only after careful consideration and consultation with teachers, administrators and parents. The student should be observed and if she engages in the undesired behaviour again, the overcorrection is to be repeated. Positive behaviours should always be reinforced and teachers should take advantage of every opportunity to praise, catch students in good behaviour, not just in bad.

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Another important principle of behavioural learning theories is **immediacy of consequences**. It is far more effective in influencing behaviour for the consequence to follow immediately or as close thereafter as possible, than for the consequence to follow after some time has passed. Then we risk the chance that the behaviour which are trying to reinforce is forgotten and the pleasure will not be derived from exhibiting that behaviour for which the reward was intended. The reward will therefore not be as effective in teaching the child to repeat the desired behaviour as if the reward had followed closely after the behaviour. As stated previously, in the classroom it is important that teachers praise good behaviour as much as they scold bad behaviour. If students receive immediate feedback, the behaviour will more likely be repeated as the consequence will have taken greater effect.

Another important principle surrounding reinforcement is that it does no harm for a teacher to reinforce positive behaviour as a student improves and develops instead of waiting until they master a concept and perform perfectly. **Shaping** is the process of guiding students toward a bigger goal by reinforcing smaller, more attainable goals until that greater end is met. This is done through a progression of **successive approximation** as students build their skills. In shaping it is important to remember that tangible or edible reinforcers are not used to reinforce the small steps along the way, but rather praise and recognition. Once the goal is achieved an intermittent reinforcer should be employed to **maintain** the behaviour.

Once a behaviour is established it does not follow that once we remove the Pavlovian stimulus the learned behaviour will disappear. If we remove the reinforcers some behaviours will intrinsically be reinforced by the pleasure derived from performing the activity. Parents and teachers can employ the use of **variable-ratio schedule** where reinforcement is unpredictable, in contrast with the **fixed-ratio schedule** whereby the timing of the reward for performing a particular desired behaviour is known. With the variable-ratio schedule, since the timing of the reward is unknown the student will become accustomed to meticulously completing his work in order that he will receive the reward when the opportunity arises, in a similar fashion to playing lottery games whereby a person habitually plays because they never know when they will win. Variable-ratio schedules are very effective in maintaining the desired behaviour. With a fixed-ratio schedule the timing of the reward is predictable. If a teacher gives a reward every time a student exhibits the desired behavior, there is no surprise element, the student may begin to value the reward less, and become bored. Fixed-ratio reinforcement schedules can be quite effective especially at the beginning of learning a new skill in order to motivate the student to learn the new skill. In this case it is useful for the schedule to start with continuous reinforcement (FR1) to get the behaviour off to a positive start, and then increasing the number of times that the behaviour must be performed to receive a reward. For every fifth time the behaviour is exhibited the schedule would be referred to as FR5 and every tenth time, FR10. This gives the student the

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opportunity to practice performing the behaviour independently, causing the behaviour to seem more natural to the individual, and less at risk for extinction in the absence of reinforcers.

Another type of reinforcement schedule is the **fixed-interval schedule**. In the Skinner box the limitations of using this schedule are demonstrated because the rats and pigeons would increase their effort closer to the final exam or when a report is due, so therefore in general students may work more consistently when given a series of short quizzes, rather than cramming for major exams the night before and retaining less in the process. Study over a longer time frame and in smaller chunks has been proven to be far more effective in long-term retention.

The final type of reinforcement schedule to be discussed is the **variable-interval schedule.** With this type of schedule varying amounts of time pass before a reward is received. This type of reinforcement schedule is highly effective in maintaining behaviour as well because students are uncertain as to when there will be an opportunity for reinforcement, and they therefore consistently work hard for that moment when the teacher may call on them to read their essay in class for example.

These four schedules of reinforcement were introduced in by Skinner.

 

The graphs show how the number of responses is rewards are less predictable in employing a variable- interval schedule in contract to a fixed-interval schedule.

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Opposite of consequences, the role of antecedents is also very important in determining behaviour. This concept is based on the fact that the stimuli that a present before a behaviour takes place also have a strong influence on behaviour and whether it will be engaged in.

Events that happen before a behaviour are known as **antecedent stimuli** or **cues**. For instance when a child who has developmental disabilities is seated beside a parent on a sofa, she will exhibit less self-injurious behaviour than when she is seated in wheelchair or placed on the floor. In other words the setting or child’s location is the antecedent stimulus for the particular behaviour.

**Stimulus discrimination** influences what behaviour will take place as well. When we select which cue will earn us the most favourable outcome to a given behaviour we are discriminating between antecedent stimuli. That is, certain conditions must be in place before we will behave a certain way. Consumers for example will behave a certain way once certain criteria have been met or certain conditions are present. If a consumer has a particular family setting or economic status for example they discriminate between the products they will buy in contrast to another person in different circumstances. Likewise, a student learns to discriminate between concepts such as letters q and p or the words effect versus affect. In the classroom a teacher must be explicit with describing the particular behaviours that will be rewarded. The teacher might say “I will give a star to everyone who has eight correct answers out of ten”, so that students can learn to discriminate the important activities to help them accomplish a greater goal, breaking down a more complex concept into smaller more manageable chunks.

When antecedent stimuli are very similar, the individual may perform the same behaviour. This is a concept known as **generalization,** whereby behaviours will be repeated in other similar settings, once the behaviour has been learned. Teachers cannot assume that students will generalize tasks that they have learned in one setting and transfer them to another, but the hope is that behaviours will be transferred among similar settings.

There are seven strategies to ensure generalization across similar circumstances. For example, if students have learned that they behave a particular way in Spanish class, they would be expected to behave in a similarly in History class as well, as long as those subject teachers have implemented similar class management programs.

We should reinforce our students whenever behaviour is repeated across similar settings and stimuli should be common. In getting a child accustomed to doing her homework you would always use the same setting, such as a particular table or desk, but with different subjects. The desk then becomes what she associates with doing her homework. Training a child toward what is usual helps in ensuring generalization as well. For instance, we can change the setting to a

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different location but similar arrangements as well. This is useful in toilet training a child for example, whereby we will take the child to different toilets to ensure that the child does not become accustomed to just one toilet. In a similar way we can teach students to generalize test taking strategies across different subjects. We can also use self-generated mediators of generalization, such as issuing bumper stickers for parents’ cars stating “honour roll student aboard”. The child is likely remember the feeling every time he sees the sticker and strive for honour roll every term! We might also have a poster on our classroom wall that boasts “best-behaved class!”. Our students are likely to carry that behaviour to every class they attend if they see a constant reminder. Modifying natural environment is also helpful in promoting generalization as well. For example, if we are trying to get a child to sit and do all his classwork during a class period, then every teacher the child has should make a big deal of it when the child exhibits this behaviour. This way the child is likely to generalize the behaviour.

The Way the Human Brain Works

 The degree of retention of information that is learned depends largely on the type of information that is presented or taught. People retain mathematical or other concepts longer than factual information such as names or dates. Our **semantic memory** is where we retain concepts, principles or rules, and how they are used – our problem-solving skills and learning strategies. The information in our semantic memory is stored as networks of ideas. **Procedural memory** is where we retain “how-to’s” such as knitting for example, in contrast to facts. This information is stored as stimulus –response pairings. Our **episodic memory** is where we keep images of events that happen in our personal lives.

Study Strategies for Long-term Retention

I will now discuss some long-term memory strategies and study strategies that can be employed to aid learning. If a student is able to guide and control their own study period this is known as self-regulation of learning and these students usually enjoy greater academic success. Also, students who have the skill to direct their study process and exam success are often more motivated to repeat the performance hence learning more. They have increased confidence in their abilities, and become more optimistic about being successful. Teaching children effective study strategies to succeed academically helps them to

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achieve while in school, but may also encourage them to become lifelong learners who are goal-oriented in various facets of life and individuals who are driven to succeed, as their success academically fuels their motivation to do well in other areas of their lives.

Classroom teaching strategies that involve students actively in lessons in a “hands-on” approach, are far more effective in aiding students’ long-term retention of information than when students are merely spoon-fed the information without having to be curious and finding things out on their own.

Information is also retained to a much greater extent when broken down in to small palatable chunks and learned over a reasonable period of time, than when it is all “crammed” into a relatively short span of time. Information is forgotten during a process known as interference when new information is presented to quickly after they have received a set of information. Students do not end up having enough time to digest what they have learned, so to speak and are unable to store the information in working memory. In order to decrease this occurrence, teachers should allow sufficient time for students to memorize information and not present similar concepts too close together, time-wise, else they may forget through a type of interference known as **retroactive inhibition**. Retroactive inhibition is perhaps the most important of all the types of interference as students should completely understand one concept before another is presented, and when it is proven that the students understand the concept they should be rewarded. Teachers should use different instructional methods to teach similar concepts so that students will have different associations in their mind to refer to in order to differentiate the information.

There are various other forms of interference such as proactive inhibition, when we have learned a particular concept and we try to learn an opposing concept, the previously learned information gets in the way of learning new information. The student should practice the ability to suppress a habitual response and think of things in a new way.

The concept of facilitation is also important in learning and educators should wherever possible offer students material that will facilitate students learning in other subjects as well by **proactive facilitation** or retroactive facilitation.

The concepts of **primacy and recency effects** are also very important in retention of information. It is a well known fact that if students are given a set of information they are more likely to remember the first information received – the primacy effect and the last information received – the recency effect. The students are not likely to remember the information which was presented in the middle. Therefore, teachers should strategically place the most relevant concepts at the beginning and at the end of their lessons. Likewise, as students study for tests

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they should study in small bits of time, taking short five minute breaks in between, to minimize the size of the “middle” they will forget.

The ways in which students learn in classrooms include **paired-associate learning**, whereby they associate one item on a list with a match, for example a Spanish verb with its English equivalent. Students also learn serially. **Serial learning** is entailed when we learn our National Song for example. **Free-recall learning** consists of memorizing a list and then producing the list in no particular order, such as memorizing the National Symbols.

One common study strategy is **note-taking.** Note-taking can be effective in the retention of information that has been read or presented in the form of a lecture because we engage the mind first of all in deciding what is note-worthy. The process of writing it down aids in our retention of the facts as well, so that when a student reads over her notes, she can more easily recall the information, being the one who actually wrote the notes. The more we engage our minds during the note-taking process, the better we retain the information. This is the case when we paraphrase our notes or write them to present to peers or other students for example.

**Underlining** **or highlighting** is also effective in helping students to retain information. This is probably the most commonly used strategy, and is most effective when students discriminate between which information is the most important to highlight.

**Summarizing** is also a relevant study strategy, as it engages students’ minds in deciding which information is the most important include in their summary.

Requiring students to **write** what they have learned has also proven effective in helping them to retain the information long-term. In a similar way, **outlining or mapping** information into a network of connected data aids retention as well.

The PQ4R method, which stands for Preview, Question, read, reflect, recite and review, engages students’ minds in a number of different ways, in effect exercising their minds, as Thorndike encouraged. This method ensure the greatest chances of retention as students have to organize the information and then play an active part in formulating questions about the material and finding answers to his questions. The student is then afforded the opportunity to review the information over a time.

Making our learning relevant to information we already know helps us to internalize new information as well.

**Advance organizers** are initial statements about a subject that are designed to introduce a new topic in a way that information the students already known is brought to mind. Cues, questions,

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and advance organizers are strategies that help teachers to set the stage for learning. This helps bring students’ attention and interest on what they are about to learn. Bringing prior knowledge to students’ minds aids in the students’ understanding of a new topic and in long-term retention. Employing advance organizers as well as having students predict what they are about to learn, are very important in students’ retention and applying prior knowledge.

It has been found that learning increases when teachers ask questions that are based on the most important content, not what they believe students will find most interesting. Teachers should also ask more difficult questions that require students to think, than to just simply recall facts. Students learn more when they are presented with advance organizers in different modes. Graphic organizers show connections between new ideas or concepts and previous knowledge, providing students with a visual framework for acquiring and organizing new information. Teachers should pace themselves in asking questions as this gives students the chance to think.

In a similar way to advance organizers, **analogies** also encourage students to draw on prior knowledge to help them learn new information. In order to use analogies the student should completely understand the analogy in order to make inferences about a new concept.

Another important concept in learning is the use of **elaboration** to make connections between new material to be learned with information that is already known by the student. Elaboration makes the new information more meaningful by connecting it to something with which we are familiar, hence aiding retention.

Use of conceptual models is another way that teachers can assist students in learning. This is a means of organizing information or concepts. Knowledge maps is one variation of conceptual models and shows the student connections between the main areas of a topic and aids in retention.

As stated previously students should be encouraged to study information that they have received long before the test rolls around. A key to developing self-regulation skills is showing children how to set study goals on their own. The goals should be related to the content and quantity of what they have to cover. Younger children may require more guidance in this. Setting goals means breaking larger tasks down to enable better retention. Doing five multiplication problems every night in preparation for a quiz or learning ten vocabulary words every week for Spanish.

Setting study goals should also require a routine place, which the student will associate with studying and learning. This place does not necessarily have to be in a quiet environment. Study should take place in whatever environment works best for the child. This will allow more effective study periods which aids retention. Children should be encouraged to think about the

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specific behaviour that will help them cover what they need to. In this students learn important planning skills.

It must be understood that different learning strategies will work best for different materials, for example when practicing for a spelling test, repetition works best for mastery.

Thinking about progress and achievement will help the student understand what strategies have helped him the most, and what has helped the least. This way the student can discriminate what is the best use of time. Experiencing success, while understanding what needs to be improved upon in order to increase success, helps to motivate students to continue their hard work.

Study time should be preceded by the appropriate conditions as well such having all the correct tools and supplies such as highlighters, rulers, dictionaries, a computer and the like in place when it is time to study.

Students should prioritize study tasks in order of importance or by due date to avoid "forgotten" quizzes and tests, or tests that are far in the future. Use of a study agenda will assist in this process.

Assessing study difficulties will also help students to work directly with school psychologists, or school counselors to develop interventions at home and at school if difficulties continue.

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