Case Study: Savannah

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SPSC 1164 - 004 Motor Skill Acquisition

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"Learning Styles & Perceptual Modes"

Circle: **@visual learner**

Explain Rationale & Application to learner, skill and/or activity(s):

 Learners take in and process information in various ways (Coker, 2013), and from what were given in the case study, it is evident that Savannah is a **Visual Learner** as she "learns well from seeing others perform and imitating them". Now that we know what type of learner Savannah is, we can begin to develop strategies and ways of teaching that are appropriate to her style of learning. As her practitioners, we need to give her lots of visual demonstrations of professional golfers and video feedback from herself so she can begin to detect and correct her errors.

 "Stage of Learning"

Circle**:   @Cognitive Stage**

Explain Rationale & Application to learner, skill and/or activity(s):

From what we know about Savannah so far, we can tell that she is in the **Cognitive Stage** of learning. Coker (2013) defines this as a stage that involves a high degree of cognitive activity, and his/her primary task is to develop an understanding of the movement's requirements. On the case study sheet it clearly says that "Savannah has never tried golfing but has seen the game on TV a few times.", so we can safely say that she is indeed in the cognitive stage of learning. We will expect Savannah to use a trial an error and method until she becomes familiar with swinging a golf club. With effective verbal instructions and visual demonstrations however, we can facilitate savannahs progression through the **Cognitive Stage** and into the **Associative Stage** (Coker, 2013). As she is currently in the **Cognitive Stage,** she lacks the capability to determine the specific cause of an error and will be unable to make necessary adjustments (Coker, 2013). Since we will be her practitioners, it is up to us to play a key role in detecting errors, correcting errors and help her develop the skills to detect and correct for herself (Coker, 2013).

"Transfer of Learning"

Circle: **@Positive Transfer   @Strategic/Conceptual Transfer**

Explain Rationale & Application to learner, skill and/or activity(s):

With Savannah, it's important that we look at her previous skills. As a practitioner who also participates in Yoga and has used Pilates exercises in my own training, these two previous skills can have a **positive transfer** on her golfing ability. **Positive Transfer** is defined as a learners past experience with a skill that facilitates in learning a new skill or using said skill in a different context (Coker, 2013). Being that she participates in occasional yoga and Pilates classes we can assume that her flexibility is better than the average person. We can also assume that she has must have a good level of balance and posture due to these classes. Using these skills she has with balance, flexibility and posture, we can incorporate those into her golf swing and hopefully see a good example of **Positive Transfer.** The balance will help with keeping her feet planted throughout the swing, which she had a hard time doing in the video. The flexibility skill will aide in being able to have a full range of motion with her swing, as she currently only has a ¾ swing when looking at her attempts on the video. Finally, her posture skills will aide in keeping a steady body position throughout the swing as any shift in the body during swing can cause the swing plane to change and then the face of the club will hit the ball off center, which will result in a slice or hook shot. All of this we would consider to be **Strategic/Conceptual Transfer** as well since we can assume she would use certain strategies in her golf swing that she uses for yoga and Pilates. Such strategies that we can assume she may have would be controlled breathing, which is important to have when performing a golf swing, and once again the ability to control her limbs and maintain balance throughout (Coker, 2013).

"Background of Skill Performance"

Circle: **@biomechanics of skill movement   @ identify key aspects of preparation-execution-follow through   @ task analysis or checklist of desired execution   @ key points of tactics listed**

Explain Rationale & Application to learner, skill and/or activity(s):

According to Hume, Keogh and Reid (2005), **biomechanics** has a role in maximizing distance and accuracy of a golf shot. The **biomechanics** of a golf shot include; body angles, joint forces and muscle activity patterns (Hume, Keogh, & Reid, 2005). It is important to translate the data from these areas into coaching points for the golfer (Hume et al., 2005). Before we look at the **biomechanics** of Savannahs golf swing, we first need to understand what important things to look for or in other words, a **task** analysis.

The biomechanics in golf refer to balance, body center of mass, base of support and the torque of the arms (Hume et al., 2005), these are all things to look for when analysing our learner. Another key aspect to look for when analysing our learner are **preparation, execution and follow through** of the gold swing. Now that we have an understanding of how to analyze our learner we can begin. When we begin to look at the video of Savannah golfing we can immediately see that she has some familiarity with golf as her stance is correct.

When we look closer at this **preparation** of her golf shot we can see a couple things. Her stance is slightly narrow which can throw off her balance as she has a narrow base of support. From analyzing the video is would appear that the **execution** of her swing is where we will find the most errors.

The **execution** phase of her golf swing involves everything from the moment she begins her backswing to the moment where she strikes the ball (Hume et al., 2005). When she first begins her backswing we can see that she immediately adjusts her grip of the golf club. This can cause the club face to come down on a different angle which will result on a slice or a hook shot. As she continues through her backswing we can see that she is very imbalanced, this will cause decreased stability throughout the swing and lessen her ability to transfer her weight correctly through the swing (Hume et al., 2005). As she continues through her downswing we can see that her elbow is not locked, which will lead to poor contact with the ball as the club face may hit the off center. The purpose of a downswing is to return the face of the club to the ball on the correct plane and with maximum velocity (Hume et al., 2005). We can also see that during her backswing she lifts her lead foot. According to Hume et al. (2005), during the downswing the lead leg should bear approximately 40% of the golfer's weight and passively rotate externally due to right pelvic rotation. Due to the lift of the lead foot, we can assume that there is no weight on the lead foot and that she is going to make poor shot. However, we do see external rotation on her lead foot which is a positive. Next we move on to her **follow through**.

According to Hume et al, the purpose of the **follow through** is to decelerate the body and club head whilst the hands and wrist follow the swing path (Hume et al., 2005). We also want to see her finish with her trunk facing the target in a slight hyperextension and her hands beside her left ear while maintaining balance throughout (Hume et al., 2005). When reviewing her swing we can see that her trunk faces the target at the end of her **follow through** although she is not quite

in hyperextension. We can also see that her hands are slightly behind her left ear but that is fine as she is quick to try again and doesn't want to hold the finish stance. Looking over these **key aspects** of her swing we are able to see where she goes wrong **biomechanically** speaking. By analysing the **biomechanics** of her swing, we are able to later diagnose and correct these errors and hopefully improve her golf game so she can enjoy golfing with her partner.

TEACHING

"Motivation"

Circle: @learners receptivity to instruction   @ instructions that captivate learners interest   @positive supportive learning environment   @ choice   @ self-directed   @ clear expectations

Explain Rationale & Application to learner, skill and/or activity(s):

Savannah has laid out **clear expectations**: to contact the ball regularly, and to drive 140 yards. Along with those goals, Savannah wishes to play alongside her partner and have fun, which provides great motivation to learn, and will increase her **receptivity to instruction**. We assume that the **instructions will captivate the learner's interest**, and we will provide reasons as to why learning a proper golf swing is important to the game. A **positive supportive learning environment** will help to quell any apprehension Savannah may feel in learning a new skill – and game – in order to play alongside her partner.

As Savannah is both a visual and kinesthetic learner, providing her the opportunity for **self-directed** learning is critical after **demonstrating** the skill. We will provide Savannah the choice of seeing the **demonstration** again before attempting it herself.

"Goal Setting"

Circle: @Performance Goal @Specific   @Measureable @Achievable   @Realistic   @Timely

Explain Rationale & Application to learner, skill and/or activity(s):

Savannah's goals are **performance goals**, she is mainly concerned with self-improvement. Such goals tend to "focus on improvements in performance based on one's own previous results" (Coker, 2013). Because performance goals focus on self-improvement and under direct control of the learner, they can be more effective than outcome goals.

We assume Savannah's goals are laid out in the **S.M.A.R.T.** format (Coker, 2013):

- **(S)pecific**: a goal clearly defined to what the performer wants to accomplish. It helps direct behaviour more precisely than "do your best".
- **(M)easurable**: typically measured in 10 percent increments. This helps provide a quantifiable means of tracking progress.
- **(A)chievable**: a goal should be attainable given the learner's current skills and abilities. Caution is warranted, though a goal may be achievable, it may not be realistic.
- **(R)ealistic**: a goal must be set at an appropriate level of difficulty otherwise it will have little value It should not exceed the learner's capabilities by a large amount, but rather just slightly beyond the learner's current level of performance.
- **(T)imely**: goals should have a specific time frame for completion as it provides a clear target. A broad or undefined time frame can lead to the learner losing interest or motivation.

Such a layout or framework creates a meaningful and positive goal to the athlete and trainer, and hold the athlete accountable for their learning (Armenth-Brothers, Boyce, & Wayda, 1998).

We assume that Savannah's goals are:

- **Specific**: Savannah wants to be able to contact the ball consistently, drive the ball 140 yards.
- **Measurable**: Savannah wants to make contact with the ball 9 out of 10 times, drive the ball a minimum of 100 yards per drive.
- **Achievable/Attainable**: As a novice golfer, Savannah's goals are not the easiest, but they are attainable with a good work ethic and continued practice.
- **Realistic**: Savannah's lifestyle will allow her the time to complete her practice sessions, and her motivation to play alongside her partner will be a great driving force to achieve these goals.
- **Timely/Trackable**: Savannah will practice at the driving range three or four times per week, 30 to 45 minutes per session, for 10 weeks.

"Verbal Instructions" – introduce and refine task

Circle: **@amount of information   @ precision of language @external focus @ Check for Understanding**

Explain Rationale & Application to learner, skill and/or activity(s):

We would keep the **amount of information** to short and simple. Explanations or instructions that are long and detailed can overwhelm a learner's short-term memory storage and/or attentional capacity. Instructions for a golf swing can be broken into five basic components, and those components can be put together to form the actual striking motion with the golf club.

With an experienced golfer, the **precision of language** would be extremely key. However, with a novice golfer such as Savannah, the golfing terms can be introduced slowly to assist her learning. The golfing terms for the components of a swing are:

- Address: also known as the setup, or the preliminary movement. It is where the player steps up to the ball and sets their stance.
- Backswing: also known as the recovery phase. The player pulls the club back from the ball, up in the air and in, to create the swing plane.
- Downswing: also known as the force-producing movement. The player swings the club down to strike the ball.
- Impact: also known as the critical instant. This is where the clubface of the golf club strikes the ball to transfer force and velocity.
- Follow-through: The player follows through after the impact, allowing their eyes to track the ball in flight as their torso and waist point towards the chosen target.

Savannah should keep an **external focus**, focusing her attention on the effects of her actions rather than concentrating on a specific body movement. The advantages of an **external focus** have been seen in both the learning and performance of skills across many sports, such as pitch shots in golf, tennis strokes, and a number of balance tasks. Rather than focusing on any particular part of her body - i.e., shoulders, wrists, feet, etc. - as she strikes the golf ball, Savannah should instead focus on the force exerted through the club into the golf ball.

But the amount of information, language used, and focus can be rendered useless unless we **check for understanding**. Typically checking for understanding involves the learner restating the key elements of the skill, and asking any questions for clarifications. Since Savannah is a visual and kinesthetic learner, she could ask for another demonstration of a proper swing, and break the movement down into its components to demonstrate before attempting a full swing.

Instructions to Savannah: "step up to the ball, equal distance between the ball and each foot. Look at where you want the ball to go, then at the ball. Backswing and pull your lead shoulder in, pause, then downswing and rotate your hips to follow, impact, and follow through. Shift your weight as you swing, don't take a step."

"Skill Presentation"

Circle: **@demonstration   @discovery learning**

Explain Rationale & Application to learner, skill and/or activity(s):

As Savannah has no previous golfing experience but has watched a few games on t.v., she would need an initial **demonstration** of the technique. A **demonstration** will allow a new learner to utilize the **mirror neuron** neurological effect and begin learning through **observational learning**. We would demonstrate two or three times while giving **verbal instructions**, and one or two **demonstrations** without any **verbal instructions**.

Given Savannah's tendency towards **visual learning** and **kinesthetic learning**, we assume she would do well with **discovery learning**. The learner is introduced to the movement and goal, and encouraged to find a solution to any problems through trial and error.

We would **demonstrate** the golf swing at the introduction of the skill two times at regular speed and once in slow-motion, all with **verbal instructions**; and one or two times at regular speed without **verbal instructions**. To assist in Savannah's learning, we would place still pictures of the five steps in a golf swing on the opposite wall so she could see them. As Savannah attempts the skill, we would demonstrate further upon her request.

"Breaking Down Skills"

Circle: **@whole   @segmentation   @repetitive part method**

Explain Rationale & Application to learner, skill and/or activity(s):

A golf swing has five parts to it, and it would be best for Savannah to practice the golf swing as a **part practice**, which involves breaking the skill into natural parts or segments. She would practice those parts separately until they are learned, and then integrate them together to perform the entire skill in its entirety.

To assist with the **part practice method**, **segmentation** can be used. **Segmentation** involves separating the skill into parts according to spatial or temporal elements, and would occur specifically as **repetitive-part method**. This method provides the learner with a better understanding of how the parts of a skill fit into the whole. The learner adds new components together, rather than practicing them individually.

We would break the golf swing into these components: address, backswing, and strike which would consist of downswing, impact, and follow through. Savannah would practice stepping up to the ball until she finds a comfortable stance and distance, then she would add the backswing to the address, and then add the strike to the address and the backswing.

"Practice Context"

Circle: **@Variable Practise @Blocked Practice**

Explain Rationale & Application to learner, skill and/or activity(s):

The golf swing is the same with nearly every club, with a notable exception of the putter. A **blocked practice** allows the learner to practice one skill or variation of a skill repeatedly before moving on to another variation.

To help facilitate learning, **variable practice** can be employed as well. A learner practices multiple variations of a given task in a **variable practice**.

We would have Savannah practice her golf swing with a variety of clubs and drivers, one at a time, with 20 swings per club before switching. After 10 swings, environmental variability would be introduced, with obstacles to chip the ball over, or obstacles to avoid that would simulate trees.

Practice Distribution

Circle: **@ Massed**

Explain Rationale & Application to learner, skill and/or activity(s):

The game of golf is virtually the definition of a **distributed practice**, where the rest component is equal to or greater than the active component, but to practice a swing, a **massed practice** is

required. The time allocated to rest is less than the time spent practicing a skill in a **massed practice**, which would allow for faster learning of the golf swing.

Savannah could take a break between **blocked practice** sets to hydrate and stretch before switching clubs. The break would be quick, 60 to 90 seconds before resuming practice.

ERROR DIAGNOSIS

"Measuring Performance Progress"

Circle: **@retention test**

Explain Rationale & Application to learner, skill and/or activity(s):

A **retention test** – a test that measures the persistence of a skill performance after a period of rest where the learner has not engaged in any practice – would be best for Savannah. We would test her on the five components of a golf swing orally before she swings on her second practice session. We would ask her to give as many details as possible – i.e., equal-distance stance at the ball, lead shoulder in on backswing, hips pointing at the target during the follow through – for each component.

If there are any parts missing during her oral recital of the golf swing, we would provide the missing part(s) upon her completion of the test. The test would help her think critically about her golf swing and start her own error detection and correction.

"Observation" – reflect on videographers decisions in videotaping performance

Circle: @key elements/critical features @view angle/position @number of observations @video observation

Explain Rationale & Application to learner, skill and/or activity(s):

Specific body movements that are observable and affect the performance of a skill are **key elements**, or **critical features**. They are often observed best through **video observation**, which can be used to slow down, pause, or advance frame by frame on the movements that are otherwise occurring too rapidly.

However, the **view angle and/or position** for recording is key. Recording the learner along the incorrect plane would not allow for a proper **error diagnosis**. Similarly, increasing the **number**

of observations of the learner will not only allow them to grow more comfortable in front of the camera, but also allow the teacher to see consistent errors and correct parts.

In Savannah's case, a sagittal view would benefit her swing in order to see if the club followed a stable trajectory from the downswing to the follow through. We can begin to diagnose errors with the two recorded observations of the frontal plane, but one or two more observations would be helpful, along with at least two observations along the sagittal plane.

"Skill Analysis & Identification of Critical Errors"

Circle: @ comparison to @strengths

Explain Rationale & Application to learner, skill and/or activity(s):

Using a program such as Ubersense, we can record Savannah and make a **comparison to** a professional golf swing. The side-by-side view will allow Savannah to see her **strengths** and **weaknesses**.

We assume that Savannah prefers to hear what she is doing correctly in her golf swing, so we will compare her **strengths** in a **comparison to** a professional golfer. Savannah does well at keeping her eye on the ball, and has a decent follow through motion already. Once she corrects her **weakness**, her **strengths** will improve dramatically.

"Identify Cause(s) of Error(s) related to Motor Learning and Control"

Circle: @Comprehension Error @Recall Error   @Execution Error

Explain Rationale & Application to learner, skill and/or activity(s):

As shown in her video, there may be a **comprehension error**, where the learner does not understand the requirements of the skill or what is expected; but more likely it is a **recall error**, where the learner may have problems remembering movement and strategies due in part to the passage of time between practice sessions. A final cause of error may be an **execution error**, where the learner selects the appropriate response to a situation but cannot execute that response correctly.

Savannah might not understand about keeping a wider stance and lower centre of gravity in order to better shift her weight, or she may have forgotten that fact and instead opts to take a step with

her lead foot. She may know and remember about keeping a wide stance, but simply may not be able to properly maintain her stance while starting her backswing motion.

"Observable Characteristics of Learning"

Circle: **@increase in consistency @better ability to error detect and correct @improved self confidence**

Explain Rationale & Application to learner, skill and/or activity(s):

Through the video, we begin to see an **increase in consistency**, which is indicative of a relatively permanent change in a learner's capability to execute the motor skill. The skill development is further shown by a **better ability to error detect and correct**, which illustrates the capability to monitor and interpret the exteroceptive and proprioceptive feedback provided from the various sensory receptors. And as a learner becomes more skilled, there is **improved self confidence** in the ability to perform the skill, which can result in increased motivation to further improve.

There is an **increase in consistency** in Savannah's ability to contact the ball, and we see she is starting to get a **better ability to error detect**, evidenced by her second observation and auditory reaction to her contact with the ball, if not **error correct**. We see signs of **improved self confidence** on the video, as she is able to laugh at her errors, and shows no signs of stopping her learning.

"Select Error to be Corrected"

Circle: **@Capability of Learner to Correct @Time needed to Correct (cost/benefit) @Learner Motivation to Correct**

Explain Rationale & Application to learner, skill and/or activity(s):

The errors have been detected, and now comes the correction. Three questions must be considered when it comes to error correction: **is the learner capable**, does the learner possess the underlying abilities and the physical prerequisites; **how much times is needed**, which will depend on the type of correction (**retry**, **refine**, or **rebuild**); and **is the learner motivated**, which can depend on if rebuilding the motor program is required.

We assume that Savannah is **capable** of correcting the errors, and that she will maintain her **motivation** to continue learning because she will only be required to **refine** the motor program.

She has established a pattern for her golf swing which requires improvement rather than a new pattern altogether, it will take a moderate amount of effort to correct with a reasonable amount of learning, which will take a varying amount of time. It may decrease her performance initially, but her swing will improve to greater heights more quickly than she may realize.

ERROR CORRECTION OR INTERVENTION

"Feedback Types

Circle:	@KP	@visual	@video	@descriptive	@error-based	@ correct based

Explain Rationale & Application to learner, skill and/or activity(s):

Since Savannah is in the **Cognitive Stage** of learning how to golf, we don't want to overwhelm her with many different types of feedback. Since she is a **visual** learner, getting her to watch videos of her performance will be a good place to start. Viewing information regarding the specific characteristics of the performance that led to an outcome is known as **knowledge of performance (KP)** (Coker, 2013). By watching **videos** of herself performing a golf swing, she will begin to see where she makes errors and where she is correct. While watching the replays of her swing attempts, we will use **error-based** and **correct based** feedback to let her know that she is also doing things right, this is also referred to ask the "sandwich" approach (Coker, 2013). Our goal with **error** and **correct based** feedback is too reinforce correct performance and offer encouragement to motive the learner to incorporate the error correction recommendations (Coker, 2013). We will also provide **descriptive feedback** to Savannah while she is looking at her replays. Although Coker (2013) explains that **descriptive feedback** can only be used if the learner understands their implications, we will use a simpler version of **descriptive feedback.** Instead we will just point out that the reason why her shots are hooking are because her elbow is not fully extended in her backswing.

"Feedback Frequency"

Circle:	@faded	@ average	@learner regulated

Explain Rationale & Application to learner, skill and/or activity(s):

There are several types of feedback we can give Savannah but we must choose the ones that will positively impact her. The first type of feedback to give Savannah will be **faded feedback.** It is where you give learners a high frequency of feedback in the initial stages of learning in order to facilitate their understanding and acquisition of the movement (Coker, 2013). Once Savannah achieves some basic proficiency levels we can reduce the **faded feedback** and begin to giving her **average feedback**. This where roughly every five attempts at the skill, we will give her feedback on what needs to be corrected the most (Coker, 2013). This helps us as it eliminates the need to analyze every error that we see and lets us disregard occasional performance variability (Coker, 2013). We will also encourage Savannah to use **learner-regulated feedback** where she can request feedback at any time (Coker, 2013). This will savannah to retain crucial information about her golf swing (Coker, 2013).

"Feedback Timing "

Circle: **@ Feedback delay interval**

Explain Rationale & Application to learner, skill and/or activity(s):

With golf, when you don't have peace of mind during your swing, you can begin to start hitting the ball off center. Since we do not want savannah overloaded with things to think about, were just going to focus on **feedback delay interval**. The **feedback delay interval** is defined by Coker (2013) as giving feedback at just the right time where the learner has time to process their own movement produced feedback. If we give feedback too soon, we can impede Savannahs development of error detection and error correction (Coker, 2013). Also, if we give feedback too late, we run the risk of Savannah forgetting the details of her previous practice attempt (Coker, 2013). We will also assist Savannah in developing her self-evaluation skills by asking her questions that allow her to reflectively think about her practice attempts (Coker, 2013). Such questions can include; "How was your follow through that time" and "Why does the club make that sound when you contact the ball" (Coker, 2013). According to Coker (2013) learners may have a difficult time responding to questions such as these. Assuming this is the case with Savannah, we can ask follow up questions that guide our learner to the appropriate answer (Coker, 2013). Using the questions we asked earlier, such follow up questions would include: "did your arm cross your body?" and "were you thinking about anything during the swing?" (Coker, 2013). Eventually, we look exchange ideas with Savannah rather than just having a one

way transfer of information (Coker, 2013). Exchanging ideas with Savannah will further develop her problem-solving capabilities that are needed to further her skill acquisition (Coker, 2013).

"Manipulate Task Constraints "

Circle: **@equipment   @task criteria**

Explain Rationale & Application to learner, skill and/or activity(s):

Since Savannah is in the **Cognitive Stage** of learning how to golf, we want to try and avoid manipulating the rules or situational factors. What we can do however, is change her **equipment** and her **task criteria**. Since her swing plane is slightly off, we could get her to do a series of drills involving a half-swing of the golf club. By using a half swing, Savannah doesn't have to worry about the club face moving off center and can now focus on the pendulum motion that is a golf swing. We can also let her do some activities with a weighted golf club. A weighted golf club will pull her arms towards the ground and will help eliminate her bent elbow that she has during her backswing. We can combine the weighted club at first with the half-swing drill and then move up to a full swing weighted club once she becomes more comfortable.

"Mental Practice "

Circle: **@Imagery   @ neuromuscular theory**

Explain Rationale & Application to learner, skill and/or activity(s):

With Savannah being in the **Cognitive Stage** of learning, we don't want to overwhelm her any difficult terms when it comes to mental **imagery. Imagery** is defined by Coker (2013) as mentally rehearsing a movement in the absence of any physical execution. For Savannah, getting her to imagine hitting the ball straight and on center before her swing can enhance her performance (Coker, 2013). According to the **neuromuscular theory**, mental imagery promotes muscle activity that is comparable to that during the actual movement, yet to a lesser degree (Coker, 2013).

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