



National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Exemplar for Internal Achievement Standard

Physical Education Level 2

This exemplar supports assessment against:

Achievement Standard 91328

**Demonstrate understanding of how and why biophysical principles
relate to the learning of physical skills**

An annotated exemplar is an extract of student evidence, with a commentary, to explain key aspects of the standard. It assists teachers to make assessment judgements at the grade boundaries.

New Zealand Qualifications Authority

To support internal assessment

	Grade Boundary: Low Excellence
1.	<p>For Excellence, the student needs to demonstrate comprehensive understanding of how and why biophysical principles relate to the learning of physical skills.</p> <p>This involves:</p> <ul style="list-style-type: none"> • evaluating how and why biophysical principles relate to the learning of physical skills • explaining the interrelationship between the biophysical principles. <p>The student has fully explained how and why a biophysical principle (projectile motion) relates to the learning of the volleyball serve, as well as the interrelationship between biophysical principles (functional anatomy and other biomechanical principles) (1).</p> <p>The student has evaluated how and why biophysical principles relate to the learning of the volleyball serve (2).</p> <p>For a more secure Excellence, the student would need to evaluate in more detail how and why other biophysical principles (feedback or visualisation) relate to the learning of the volleyball serve. The evaluation needs to be supported with specific examples from the sessions.</p>

Student 1: Low Excellence

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To ensure that the junior player improved, I needed to include a number of biophysical principles in my teaching of the physical skill of the volleyball serve. Some of the weaknesses the player had were, not extending his elbow when striking the ball and being upright and not using all the muscle groups to optimise force.

In my observation, I noticed that the player is not extending his elbow when contacting the ball this is having an effect on both the projectile motion of the serve and the amount of force exerted in the shot, this is related to the principle of force summation as well as the fact that $f=m \times a$. I therefore devised the balloon drill and then returned to the use of a ball. This drill would help to extend his right elbow using the triceps brachii (agonist) and biceps brachii (antagonist) muscles to strike the volleyball with an outstretched arm. Additional muscles (pectoralis major and deltoid) stabilise the shoulder to provide a stable platform for the extension of the arm. I noticed that here were deficiencies in his projectile motion. His height of release was a weakness that I identified due to the fact that he was not getting full extension with his striking arm. As the student is at the cognitive stage of learning for the overhand serve the height and angle of release is slightly different to a student at a higher stage of learning. This is due to the fact that the main outcome he is trying to achieve is to get the ball over the net and into the court, whereas someone at a higher stage of learning will be more concerned with placement away from players and as low as possible so the opposition cannot return the serve. Therefore, I worked on his angle of release being 45° and the height of release to involve a fully extended arm, instead of a flatter serve that others may wish to achieve. The drill I devised was the balloon drill. This drill would help to extend his striking arm to full extent. The angle of release is helped by the player hitting the ball/balloon from a higher point but aiming to achieve 45° . to ensure the volleyball can get over the net. The other aspect that the student needed to work on is applying sufficient force to get the ball over the net. There are a couple biomechanical principles I have had to apply involving anatomical principles as well that had to be considered.

1

Newton's Second Law tells us that when a resultant force acts on a body, it produces an acceleration which is proportional to the force, inversely proportional to the mass of the body, and in the same direction as the force this is the equation $f=m \times a$. The speed of the last part of the body at the moment of contact or release will determine the velocity attained by the projectile (ball) In other words, optimal performance requires the body movements to be performed in the correct sequence, with the correct timing. Many movements in sport are the result of the combination of a number of forces, which are performed in a sequence, this is the principle of force summation.

Force summation can also be applied by using muscles in order from the larger through to the smaller muscles in the movement of striking the ball. The muscles involved are the quadriceps and hamstring muscles, rectus abdominus, external obliques, latisimus dorsi, deltoids, triceps brachii and biceps brachii, wrist extensors and flexors. This means that the player will be able to generate more force and strike the ball with a lot more power because there are more muscles involved. So to get the greatest force being applied to the ball the mass of the muscles can be optimised through force summation and the acceleration can be optimised with timing of this.

He improved his force overtime with the drills and this was due to his timing and use of muscles improving, at the start he was standing quite front on and his legs were straight, he learnt to use his legs more and extend his knees better at the start of the movement (using the quadriceps-agonist and hamstrings-antagonist) by starting low (flexed at the knee) as well as using his trunk better (rectus abdominus, external obliques, latisimus dorsi, deltoids,) and in doing so rotating more. I knew his force was improving as he went from always being short of the net to being able to serve deeply into the opposition court. This showed me that he was learning to apply the force summation principle and therefore improving.

2

The biophysical principles involved in learning motor skills there were two major types of practice that I chose from 1. Massed practice: performing a skill over and over again without rest until it is achieved. The risks are: fatigue, poor technique, boredom, injury, frustration. Massed practice suits people that are highly motivated, low energy demand tasks and simple skills. 2. Distributed practice: performing the skill with rest sessions in between until the skill is learned. Distributed practice is often the preferred method when in the early stages of learning, energy demands are high, skill is complex, performer is not motivated, task is boring. As my student is in the cognitive stage and the skill is

complex I chose distributed practice. I believe that this type of practice did work as he did not get bored and didn't seem to tire, his technique improved and this was shown as after all the drills he could get 8/10 serves over and into the court where at the start he only got 1/10.

I also chose to use Whole– Part-Whole: this practice involves practicing the whole skill, then concentrating on the subroutines and then concluding with the whole skill again. I believe this worked to improve the students' skills as well as increasing motivation. I think the motivation increased as he saw when he first tried a lack of skill, when I broke it down into the subroutines he started to see how the serve actually worked and then when we came back to whole learning again he had really improved shown by the 8/10 at the end.

The drills I used were closed drills. This means there are no outside factors influenced the player and therefore keeping him focused. This is the most appropriate drill for a player in the cognitive phase of learning. An open skill would have too many other factors influencing him and he would lose concentration and not focus on the important parts of the skill. He can then progress to introducing these skills into a game situation and rather than have outside factors influencing the skill. This progression might include having the player serve to opposition or give the player a scenario (your team is winning 19-17) and the player has to close out the match by serving well. These game like situations would give the player challenges so that he could further improve his overhand serve. He could also then start to work on lowering the serve to an optimal trajectory.

The player is in the cognitive learning stage. This means he would need to have a lot of motivation and perseverance to complete the skills to a high standard. They also need a lot of feedback, this comes in many different forms and tells the learner how to improve their performance by comparing their current performance with the desired one. The main types of feedback he got were external, this came from me (I would give teaching points) I also tried to make my feedback positive eg "good work on extending that arm, just get the ball a bit higher" and knowledge of results (whether it went in or not), but some were internal where even if the ball had gone over sometimes he knew it did not feel right eg he said, "I think I did not follow through enough there". I also used visualization, which I helped by showing him the ideal technique, this allowed him to have seen the ideal so that he could visualise in his mind what it should look like. Visualisation involves using the mind to create images of how certain skills and situation will be performed. By putting images in his mind, the player could see how the drills are supposed to be performed and he could now have a better understanding of how to execute the skills. I actually do not think he used this that much, I think he relied more on immediate positive feedback from me or knowledge of results more. With this he would concentrate for longer and gain confidence in his own ability, which results in a higher chance of performing the skill correctly. The player's arousal level was kept at a high level because I would give him positive feedback. This would make the player feel good about himself after he receives positive feedback and therefore he would want to keep performing the skill. This comes from the inverted "U" hypothesis where I tried to ensure he was not over or under aroused.

Overall, I thought that the interrelationship between these bio-physical principles were very strong as the improvement in the force applied in his serve was due to force summation being optimised, this was through the use of the correct muscles in the right order with the correct timing. To do this the student needed to complete drills which I found were best as distributed and whole part whole learning and that this kept up the arousal level and motivation along with positive external feedback from me, leading to improved performance, not just in the final 8/10 for serving but also when he got back into the game situation.

	Grade Boundary: High Merit
2.	<p>For Merit, the student needs to demonstrate in-depth understanding of how and why biophysical principles relate to the learning of physical skills.</p> <p>This involves:</p> <ul style="list-style-type: none">• explaining fully how and why biophysical principles relate to the learning of physical skills• explaining the interrelationship between biophysical principles. <p>The student has fully explained how the biophysical principles (skill learning, biomechanical principles and functional anatomy) relate to the learning of the dig shot, as well as the interrelationship between the biophysical principles (1).</p> <p>The student has evaluated how and why a biophysical principle (external feedback) relates to the learning of the dig shot (2).</p> <p>To reach Excellence, the student would need to evaluate in more detail other biophysical principles that relate to the learning of the dig shot, supported with specific examples from the sessions.</p>

Student 2: High Merit

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Preparatory Phase

At the beginning, when I was first observing, I found that my player struggles with her preparation of the dig. No flexion of the knee was occurring and therefore there was also no flexion of the hip. Using my knowledge of functional anatomy, I was able to break down the movements and decide how I could improve the preparatory phase of the dig to help her execute successfully. As part of my lesson plan I created a drill where the cognitive learner was required to do shuttle runs and when reaching the cones squatting down with her arms in the correct dig position. This allowed the player to focus on her preparation of the dig and improving force summation while doing this. The drill would be a massed skill because it was repeated over and over again; this is to make the movement of getting a lower body position to become natural and automatic. This would be quite boring for the player though and I may have been better to use distributed practice instead this is also advised for someone at the cognitive stage of learning, which my teacher reminded me about later. The activity is a gross skill as it uses the major muscles of the body to perform it. The agonist muscle in the squat (flexion of the knee) is the hamstrings and the antagonist muscle is the quadriceps. These muscles would work together in order to create flexion of the knees and hips, which then helped to create a lower position and centre of gravity. I decided that the drill would be in a closed environment with the player totally in control of the situation, as she progressed I added in a ball when she reached the cone this made the activity move from self-paced to externally paced. The external factor of the drill was the ball being lobbed to her that I was in charge of. By adding the ball, it also increased her arousal levels and therefore she exerted more energy into the drill making it successful. I knew she was trying harder as her speed between the cones and return of the ball became smoother. Because my player is a cognitive learner I would require her to use some of her prior knowledge, I would compare the squat to the sitting down on a seat so my player had something to go off.

1

When she was completing the drill, she asked a lot of questions that is very common in a cognitive learning phase, she also made many errors, this would be a positive thing because it would give her knowledge of performance and the next time she would try something new in order to find the right way to perform the skill. I took into consideration the factors affecting her skill learning such as: she is a female, she is a junior student, that she has no prior knowledge of volleyball and that she is a fit and healthy young girl. For the second session, I feel that she moved into the associative phase of learning, therefore my goal for her would be to practice and refine the new skills put the skills into the game. The next skill I did with my player was refining where she held her hands and presenting where the correct position to hold them is. I demonstrated the correct placement of the arms and also showed her a diagram in order to be completely clear and have no misunderstanding. The arms elbow joint should be extended and the hands in supination with thumbs together making the forearm and hands as flat as possible. Another biomechanical principle that is important for the early phase is stability so I explained the importance of having a low centre of gravity, a wide base of support and making sure that she moved to the ball so that her line of gravity was inside the base of support. This would make her as stable as possible for more control over her dig.

In the execution phase the player struggled to create any force summation because she did not transfer her weight when executing the dig. Also, the arms were bent when the hands make contact with the ball, this makes it fairly difficult for the volleyball to go into the direction she desires. Because her arms were bent it made the angle of release out of her control. Even though her angle of release was not very good (this should be quite high to give the next player the opportunity to get under the ball to set or spike), her strength was the height of release as she managed to exert a large amount of force, it was just out of control. I created a lesson plan including a drill that would focus solely on the extension of the elbows and transferring the momentum to the ball. The drill that I designed was simple, I placed the player behind a line then I would stand about 5m ahead her and then lob the ball to her, throwing it about a metre ahead of her so she would be forced to move to the ball, extend her elbows and flex her knees in order to hit the ball with her hands underneath the volleyball. This worked on transferring the weight of her body, and forcing her arm to be as long as possible. I made my player perform this skill many times, changing the direction or where the ball goes in order to keep up her level of arousal. I think that external feedback from myself helped such as when I told her she should be aiming to get the ball back above my head as if I was the setter in the game situation and she began to do this I would say "great that would have been perfect for a set" and "try to get the ball a bit higher so I can get underneath" I think this linked it more to the game situation and improved her performance when she got back into the game, in the final game she got 5 balls above her teams

2

setter, so this showed it did help. The associative stage can last for a long time, therefore I focussed on the new skill and refining the performance of this particular drill. The associative learner, which my player is, still had to go over and over these drills because they do not come naturally to them. For this session, the practise would be externally paced as I was in control of when and where the ball was being thrown. This would make the activity more difficult for my player but this is necessary if she was to improve and become an autonomous learner. My players force levels were very low because she was not positioning her arms and hands in the correct position. For the dig to be performed successfully the player has to be able to slow down the speed of the ball in order for the next player to either set or spike it. The drills I completed focused on this and as she improved I made the ball move harder and harder so that she could really focus on taking the speed out of the ball. She actually got quite good at this and when she went back into the game she was able to take some quite hard shots and dig them over the setter's head.

Follow through Phase

In task one when I observed my player performing the dig skill I saw she struggled with the execution of the dig, particularly when she was finishing the follow-through of the dig. My player found it difficult to extend her legs and hips after she had made contact with the ball (this was as she was not flexing them properly in the early phases) so I used a fun obstacle course that included small ladders and mini hurdles. This activity allowed her to focus on the importance of extending the knees and hips.

After a few times of running through this course, I then instructed her to hold her arms in the position of the dig in order to reinforce the idea of where the hands are meant to be held, (two skills in one). The agonistic pair of muscles would be the hamstrings and the quadriceps. The hamstrings being the antagonist muscle and the quadriceps being the agonist for extension to occur. The joint involved in these movements is the knee and hip joints.

The main biomechanical skill that I focused on when planning this lesson was force summation as it plays a large role in how the follow through phase is performed. With force summation, it is about involving all the body part in the movement in order to gain maximum force., I focused on using the hip/thigh quadriceps and hamstrings, trunk, abdominals, shoulder/arm deltoids and hand then wrist, flexor and extensor digitorum, then the force generated increases and the force is transferred to the volleyball she is hitting. By extending the knees and hips she would be able to use sequencing and timing of her body segments it allows my player to exert a maximum amount of force and be able to control the force. So, through my sessions I used anatomy and biomechanics including use of muscles for force summation, stability as well as being aware of her stages of learning and what type of drills and feedback I should give her to help her learn the dig better and improve how she uses this in the game.

	Grade Boundary: Low Merit
3.	<p>For Merit, the student needs to demonstrate in-depth understanding of how and why biophysical principles relate to the learning of physical skills.</p> <p>This involves:</p> <ul style="list-style-type: none">• explaining fully how and why biophysical principles relate to the learning of physical skills• explaining the interrelationship between biophysical principles. <p>The student has fully explained how biophysical principles (stability and balance, and functional anatomy) relate to the learning of the dig shot, as well as the interrelationship between the biophysical principles (1).</p> <p>For a more secure Merit, the student would need to:</p> <ul style="list-style-type: none">• explain more fully why the biophysical principles of stability and balance relate to the learning of the dig shot• provide more specific examples from the sessions to support explanations for other biophysical principles.

In my observation of watching a volleyball student I constructed a learning programme to help them improve their performance of a volleyball dig. When observing the students, I noticed that they made mistakes and were not confident with their forearm pass (dig). In this evaluation I will comment on the biophysical skills of functional of the anatomy, Biomechanics and Skill learning and sports psychology.

The first focus point that came to my attention was the body positing of the student. Body positioning is needed at the start of the dig when the player is balanced and their centre of gravity is lowered. Learning how to improve their body positioning will include how to use their leg muscles. This will then start a sequence of movements and help to create greater summation of force.

When first observing the student, who is in the initial stages of learning the forearm pass (cognitive stage), they lacked in the correct technique, which I can relate to the functional anatomy concepts. When in the preparatory phase they did not have flexed knees or hips. The muscles of the quadriceps (agonist) and hamstrings (antagonist) were not used to their full strength because the student did not flex their knees or hips in order to use the strength of the quadriceps and other muscles in the legs. The students struggled with the functional anatomy and body positioning because the student was not confident with the forearm technique and were unsure how to correctly demonstrate it. This is why I made body positioning a point to focus on. The activity I have made was to help correct the students body positioning and make them more confident with the forearm pass. The student was stable but they needed to be more staggered with their positioning of the feet so that they could be more balanced and prepared for the oncoming volleyball. The force summation of the student needed attention, they struggled in the lower body but did well on the upper body with good technique in the elbows and shoulders. The activity I choose to use for body positioning is closed because the student is in the first stage (cognitive) of learning and need to focus solely at one thing at a time, for them to be able to do the drill correctly. The drill is massed which means that the activity is repetitive so that the student can understand and can comprehend what skill they are learning and why. The activity is given is guided by instructions because the student is in the cognitive stages, they need to listen and watch someone else perform the activity so that they can understand and get the idea of the correct technique. Body positioning is extremely important in a forearm pass because it gives the student the maximum potential to perform a powerful dig.

The second focus point is the technique base of support. Wide base of support is needed during all stages of the forearm pass, the skill is to keep the student balanced and give maximum potential for a powerful dig. Having a lower centre of gravity and keeping the line of gravity within the base of support means that the student can successfully produce a dig without becoming off balance. The student that I observed struggled with lowering their body and making sure they were underneath it in order to be balanced. The student lacked in flexing their knees and hips so that they could become balanced. The muscles that are used to control this movement are the

gastrocnemius and soleus muscles, hamstrings-agonist (including biceps femoris), quadriceps-antagonist (including rectus femoris) and iliopsoas (hip flexor). There was plantar flexion seen in the ankles to help keep balance but all lower body movement was limited. Focusing on getting the wide base of support is important to the student as they can become more confident with the forearm pass.

The biomechanical factors of stability is used to keep a wide base of support so that the student will stay balanced throughout the forearm pass. In my activity, stability is used to help correct base of support by the student practicing squatting on a chair. The activity I made for wide base of support is both an open and closed drill. It is massed at the start and has the variation at the end which can be seen as an open skill. The activity is an instruction based activity meaning that there is someone showing the students how to do the drill; this is needed as the students are still learning how to perform the forearm pass. The activity can also be used in a competition where the students are split up into two group and verse each other for the fastest time to complete the drill. Having a competitive environment is important because it keeps students involved and motivates them to participate in the activity with a positive attitude.

The third focus point is that of extension and flexion. Extension of the arms (triceps brachii- agonist, biceps brachii-antagonist) and flexion of the knees is needed in all stages of the volleyball forearm pass; extension and flexion are used to keep balance and to produce maximum force throughout the dig. It is vital to have good extension of the knees (quadriceps-agonist, hamstrings-antagonist) to keep the student upright and also to make sure they produce a propelling dig either to a team mate or to the opposition. The lack of extension/flexion was seen when observing the student throughout the forearm pass, the student struggled with flexing and extending the knees throughout the forearm pass, they also lacked in flexing the hips up in the movement to the follow through. Biomechanical factors of the third focus phase was the lack of force summation throughout the body. The student struggled with finding a sequence throughout the body to produce maximum power in the forearm pass. The extension/ flexion activity I made focuses on getting the student to focus solely on body movements and to get the right sequence throughout the body. The activity is closed because students are in the beginning phases of learning and need to focus on one thing at a time. The activity is a like a circuit and can be made into a competition once students have got the hang of the small activities and understand wants being asked of them. The type of instruction is that it is guided so that the cognitive learners can listen and have the opportunity to ask questions before performing the drill.

Concluding of my evaluation of the student performing a forearm pass I have seen the strengths' and weaknesses of the student and have put together three activities that hopefully will correct the student's technique. The skills of body positioning, wide base of support and extension/flexion were all focus points the student struggled with. From evaluating the student and using the four biophysical principals of functional anatomy, biomechanical factor, skill learning and sports psychology I have produced three activities that will help the technique of a cognitive volleyball student.

	Grade Boundary: High Achieved
4.	<p>For Achieved, the student needs to demonstrate understanding of how and why biophysical principles relate to the learning of physical skills.</p> <p>This involves explaining how and why biophysical principles relate to the learning of physical skills.</p> <p>The student has explained how and why biophysical principles (biomechanical principles, functional anatomy and skill learning) relate to the learning of the underarm serve (1).</p> <p>To reach Merit, the student would need to:</p> <ul style="list-style-type: none">• explain more fully why the biophysical principles (biomechanical principles, functional anatomy and skill learning) relate to the learning of the underarm serve• explain clearly the interrelationship between the biophysical principles.

Student 4: High Achieved

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An extract from the student log

Skill: Underhand Serve		
Focus points (from your biomechanical analysis in task 2)	Activity	Skill learning principles or psychological strategies used and why they were used.
<p><u>Stability:</u> Needs to make sure his feet are in the stride position so his base of support is bigger so he is more stable.</p> <p><u>Force Summation:</u> He needs to generate more force summation by using his legs and torso more effectively during his underhand server. If he generated more force summation the ball would go over the net more consistently and easier.</p>	<p>Have two ones the correct distance apart and have him do 10 consecutive serves with his feet inline with the cones.</p> <p>Have the player stand with both feet on the line. Then have him step forward with one foot on the other line and then do what he would do in a serve, but all this without the ball.</p>	<p><i>I have used this activity because I think it would most effectively show him how his feet need to be positioned to perform an underhand serve, to create more stability. I think by using this simple activity it would help him mostly focus on his feet position, this would make sure is line of gravity is inside his base of support. This activity is a serial skill as each movement (serve) has a start and a finish but they are performed continuously. This is a self-paced skill because he will serve the ten volleyballs when he wants to. I'm making it self-paced because he will be able to think about his stride position and how he is serving. This will make his serve more accurate and consistent every time.</i></p> <p><i>I think that this activity will help the player to generate more force summation by them knowing how to step forward and by using their arms, bicep brachii and triceps brachii to generate force. They will also bend down (flex) to get the ball, therefore using their quadriceps and hamstrings –agonist and antagonist – to generate more force from the biggest through to the smallest, so legs through to arms and wrist. This will help them get the ball over the net. By using the lines, it will be like an actual volleyball court so it will be easier to apply in a game. This activity would be part learning because by using this new skill combined with other skills he could master a correct underhand serve, this is breaking the skill down into parts, by having him practise the step forward and then the serve. This is a serial skill activity because he is starting and then stopping after each step forward, but is repeating it lots of times. I would make this an internally paced skill as the instructor would tell him to step forward each time this determining the pace. There is also external feedback with the instructor telling the player what they are doing wrong and then getting them to practice it the correct way next time. The player would maybe serve and not bend their legs, so the feedback would be to bend your legs. Once the player is more confident with stepping forward and using his arms I would start to introduce him into a game environment so the skill would start to be an open skill. This is a gross motor skill because you are doing big movement with your arms and legs to generate force to get the ball over the net.</i></p>

	Grade Boundary: Low Achieved
5.	<p>For Achieved, the student needs to demonstrate understanding of how and why biophysical principles relate to the learning of physical skills.</p> <p>This involves explaining how and why biophysical principles relate to the learning of physical skills.</p> <p>The student has explained how and why biophysical principles (biomechanical principles) relate to the learning of the set shot (1).</p> <p>For a more secure Achieved, the student would need to explain in more detail how and why biophysical principles, for example distributed practice, functional anatomy or external feedback relate to the learning of the set shot.</p>

After I observed my student and taking notes on the biomechanics of my student I decided that the best way of teaching my lesson plan to my student was through the 3 ways of learning. I was able to watch my student and assess the necessary areas of improvement.

Once I had observed my student I made a lesson plan that I believe would suit my player and his skills that he already has. My student had very good flexion at the elbows and at his wrists with the set, this helps him get better projectile motion from the ball by getting lots of height on the ball to get it over the net, the students were not at the stage where they could set to a spiker so the set was more to get the ball over the net. If my student bent his knees to get down lower to the ball and had his elbows bent at 45 degrees he would generate more force to get the ball over the net. This is the principle of force summation where all body parts are used in sequence starting from large muscles first like quads and then sequencing the muscle groups down to smaller muscles like wrist extensors. This would help the player generate more force to get the ball over the net and further into the court.

1

The activity I came up with was designed in a closed environment as it was in the gym, that way the student didn't have to worry about other factors. Also, I have decided to use distributed practice by having rest periods that way my student can get past the cognitive stage of learning and move onto the associative stage of learning. I believe this will help him as he will get into the correct position easily throughout a game. I think this will help with the student's overall centre of gravity and base of support which will help them get more projectile motion from the ball.

After observing my student, I feel he will work better after having gotten through the cognitive stage of learning as he will be past the learning stage of the skill. Once my student has practiced the skill and feels a bit more confident I will expand it to massed practice that way the student can practise the skills that they have been taught over and over again without a break so that it becomes a natural movement.

I will also give the student external feedback on his progress as I think this will help him to understand the skill and the correct way to do it during the prep phase. I believe after he has learnt the skill he can move on to self timed practise as this will help him feel more confident in a game situation.

In the set shot the muscles that are working are the biceps (antagonist) and the triceps (agonist) this is good as the student has the correct muscles working throughout the set movement and through all their phases of play.

	Grade Boundary: High Not Achieved
6.	<p>For Achieved, the student needs to demonstrate understanding of how and why biophysical principles relate to the learning of physical skills.</p> <p>This involves explaining how and why biophysical principles relate to the learning of physical skills.</p> <p>The student has briefly explained how and why the biophysical principles (biomechanical principles) relate to the learning of the underarm serve (1).</p> <p>To reach Achieved, the student would need to:</p> <ul style="list-style-type: none">• explain in more detail how and why the biophysical principle (biomechanical principles) relate to learning of the underarm serve, using a greater understanding of biomechanical principles, for example force summation• explain in more detail how and why the biophysical principle (functional anatomy) relate to the learning of the underarm serve, for example the joint movements and the specific muscles involved (2).

Student 6: High Not Achieved

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The observation of a student via photos and taking notes of observed technique steps and ideal technique steps of the underhand serve and biomechanics of the underhand serve meant that I had a great platform of knowledge for helping in the teaching and learning process. My observations and notes gave a good indication of what needs to be improved.

The biophysical skills aspects of exercise science, functional anatomy, biomechanics, skill learning and sport psychology all help and work together to make the learning process better and improved.

My knowledge of functional anatomy helped me with one of the activities /skills which was using an open hand during an underhand serve. My strength was that I was able to apply and pass my knowledge of functional anatomy to the student's activity to help him learn. Which was that he had to open his hand to perform the skill/activity properly which I was able to show him. I also showed him that he could get more power if he used his legs more, starting off low and then standing up before hitting the ball.

2

I applied biomechanics to help with performing the activity/skill of serving into the court of play using the underhand serve. For example, the student was overcoming the inertia of the ball too much, resulting in the ball going over the court or he was not overcoming the inertia of the ball enough resulting in the ball not going over the net. I then passed on and applied my knowledge of the biomechanical principle of force to the activity / skill. I passed on that the student had the right amount of force, so he made his arms faster or slower, so that the ball does not go out of the court of play; this helped the students to achieve more consistency, consistency of getting the ball into the court of play using an underhand serve.

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One of the skill learning principles I used was massed practice. I applied this to the activity of not moving his feet during an under hand serve. I got him to repeat the serve over and over again till he got the ideas of the activity, and had few breaks in-between. This helped him learn the skill by experience and lots of practice of the skill over and over again which is how massed practice works. He was at the cognitive stage of learning so I thought this was a good way to learn.