A practitioner's guide for outstanding cross curricular PE teaching

Shrehan Lynch

Physical Literature, as defined by SHAPE America (2015) is the primary goal of Physical Education (PE). PE incorporates a variety of skills that students can take forward into their working life. Through PE, students develop leadership skills, teamwork, strategic thinking, and abstract thinking. I believe we, as PE teachers, can go even further in the lessons we teach by incorporating literacy and math skills. This is important because 32 million US adults are illiterate (BBC, 2015). We do have time pressures as PE teachers; sometimes we are the most sought after department in school. We have lunchtime clubs, after-school activities, and not enough time in our days to plan the lessons we teach. However, PE teachers can easily embed math and literacy concepts into their curriculum to enhance student learning across disciplines. This concept of mixing subjects is called cross-curricular integration (Jacobs, 1989). Usnick et al. (2003), Phillips & Marttinen (2013), Finn & McInnis (2014) and Kokko et al. (2015) have found that cross-curricular integration is successful in an array of disciplines. Furthermore, findings indicated that integration is feasible and improved students' knowledge and inquiry skills. I have also implemented cross-curricular strategies (even as a new teacher) and found that they folded right into my teaching practice once I became accustomed to it.

Table 1 includes a variety of different strategies that I have collected for integrating literacy and math into different content units often included in PE. While this list is not exhaustive, it does provide examples to illustrate strategies related to cross-curricular integration. In a regular PE lesson there are a variety of naturally occurring opportunities to integrate math, including statistics, scoring, and distance. Students can practice by writing answers on resource cards, worksheets, or mini-whiteboards, or by responding to math questions posted on the board.

Additionally, there are moments to capitalize on the development of verbal and written literacy. The most common element of literacy across all sports is the use of key words: invasion, numerical overload, advantage, quadriceps, stride length. I have included these keywords into my lessons specifically in dance units; I will ask students, using their body parts to spell a word out with their team members. This activity really draws on student's creativity. The word I choose will be fundamental to my learning objectives, for example in this case it would be motif or space. When all the students are in place I will question the students on its definition. I have also found that resource cards are invaluable when teaching literacy because the students read the card, which will have task instructions on it, and then give written answers and respond accordingly.

More often than not these tasks become routine for students and they enjoy doing them, especially if you incorporate them into your reward system. Frequently, to check for understanding of a math question posed on the board, I would stand at the door at the end of the class. As students exit, they would whisper me their answer. If the students were confident in their answer, they would leave first, if they were fairly certain, they would leave next, and if they were uncertain, they waited behind and checked their answers with me at the whiteboard.

Furthermore, we can introduce aspects of information technology into our curriculums. With the use of technology we could film dance with a flip-cam, and students can give self-feedback. Angles of soccer kicks could be worked out using applications such as the iPad app "Coach's Eye." Also, if we wanted students to create a table of results, this could be done using a computer program, such as Microsoft Excel®.

It may seem a daunting prospect to include cross-curricular integration in our lessons, but it becomes easier when the tasks are introduced one at a time. We have the opportunity to

incorporate more than just skills and gameplay, but to deliver high quality PE that includes cross-curricular integration. Skills learned across disciplines help students build cognitive bridges between information they have learn and may increase retention (Usnick et al. (2003). A former student may be out shopping and come across a sale of 30% off the posted price. As they are working out the solution, they may remember it was their PE teacher who helped them learn the arithmetic and optimistically remember to exercise!

References

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Table 1.

Recommendations for integrating literacy and math into various sport units

Content Area	Literacy	Math
Soccer	• **Discussing** formations: **drawing** strategy on the whiteboard **explaining** it in full sentences to your team, while **listening** to others, promote the use of Point, Example, Explanation • End plenary: ask students to write a mini-article on what happened in the game that could potentially get published in the school newsletter. *This could be given as an out-of-class assignment.*	• **Count** how many shots on goal were successful. • Number of successful passes. • Number of corners taken place. • Ask students to **tally** up the results, turn them into **fractions** and **percentages**.
Track and Field	• Key muscles and bones used in exercise: **spell out** the word quadriceps and you can start skill related practice or point to the muscle. • Can be used as a whole class activity after a warm up in unison through pointing to different areas of the body. *Students with specific learning difficulties can have the opportunity to write answers or buddy up with a friend to collaborate.*	• In sprints or distance events students can **measure** their distance and workout their **average speed**. • Students can make **comparisons** from their own results to national/school **averages** in any events. • Using any of the disciplines students can work out the **mode, mean, median** and **range** of results.
Basketball and Volleyball	• Matching **key words** to **definitions** for example: the **picture** of a dig or the definition of the dig to the matched word. This can be done actively, spread your definitions round the court and ask students to find the one that matches to dig. • **Knowledge** of the names of the lines on a court, in basketball, perfect for warm ups: ask students to run and stand in the D > side line > free throw line..	• **Square roots** of numbers, ask students to work out the square root of 25 then get themselves in that number group, they should get into groups of 5. • With the use of a stop watch, **time** the quarters, **count** how long is left in the last 30 seconds. • Use the court lines, students can work out the **angles** and use the **shapes**, the three point line including the end line can be used to work out the **diameter** and **circumference** of a circle.

Softball and Baseball	• *This sport is known for student waiting time where writing can be used to enhance cognitive engagement*: **write** your team tactics/team score on a whiteboard; come up with three strategies you are going to use when fielding, **discuss** these with your team. • Design a modified game instruction resource card and ask students to **read** it and play the game or ask the students to **design** the game and **write** the **instructions**.	• Discuss **shapes** that are on the of field of play • **Angles** of shots hit, angles of the bases, **perimeter** and **area** of the field of play. • Use **comparison** questions: *if we know the area of a softball field is X and the area of a volleyball court is Y, which is higher?*
Dance and Gymnastics	• When evaluating performance use peer **feedback**: two strengths and an area of improvement in performance that students **verbalize** to others. • As a warm up within student dance groups; if they are in groups of six, ask them to **spell out** unison or cannon with their body. This increases student creativity and can be adapted easily by students randomly moving round the room and getting into other numbers of groups.	• **Counts** within a dance linked to **time**: pose a question on the board for example: *if a piece of music is 3 minutes long and in 30 seconds you can do 15 moves. How many will you be able to do total? (Answer: 90).* ***(****Students are using,* ***mental math****,* ***addition****,* ***subtraction*** *and* ***multiplication*** *depending on the question posed).*