

Approaches to sport and exercise



**ASSIGN
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Critically discuss interdisciplinary and multidisciplinary approaches to sport and exercise science within the professional experience undertaken in term 1. Support your answers with relevant literature and theory

Research within sport and exercise science is done in many different disciplines. The majority of published research, however, is mono-disciplinary (from a singular discipline) in nature (Burwitz et al. 1994). A professional experience was undertaken to assess the approaches to inter and multi-disciplinary within sport and exercise science research. The experience was of a sport science nature which involved assisting in an undergraduate research project of 3D biomechanical analysis of a gymnastic vault using CODA, focussing specifically on the approach and springboard take-off. Sports biomechanics uses the scientific methods of mechanics to study the effects of various forces on the sports performer (Bartlett, 2007). It is important to monitor technique in gymnastics to help prevent injury and improve performance. It is then possible to feed this information back to coaches to highlight strengths and weaknesses of individual athletes.

Multi or inter-disciplinary research requires a combination of methods and knowledge from more than one sub-discipline (Burwitz et al. 1994).

This essay will outline what multi and inter-disciplinary approaches to sport and exercise science are, compare how similar they are and then show how they differ. It will then outline how the two approaches can be applied to the professional experience undertaken.

An interdisciplinary approach within sport and exercise science involves a partnership of coaches with sport and exercise scientists such as physiologist or psychologists. Smith (2005) split sport science from exercise science due

to differences of individual needs from elite athletes to members of the public. Smith (2005) described sport science as being characterised by collaborations with coaches and performance directors and exercise science as being characterised by collaborations with general practitioners and professionals allied to medicine. Interdisciplinary research needs to involve a strong integration of information from more than one sub-discipline of sport and exercise science from the outset of a particular research programme (Burwitz et al. 1994). Williams and James (2001) stated that a sport or exercise team should have a scientific basis. Williams and James (2001) also developed a model to demonstrate inter-disciplinary approaches, where the goal of the sport or exercise is affected by each area involved.

Multi-disciplinary research involves less integration of the sub-disciplines of sport and exercise science. Each discipline tends to work in parallel on a common topic (Burwitz et al. 1994). Miles et al (1997) adapted Burwitz et al. (1994) definition to state that multi-disciplinary research involves sport and exercise scientists working together to solve a problem in an isolated unitary fashion and co-coordinated manor. In a multi-disciplinary approach each sub-discipline will look for problems to a solution from within only that discipline, for example a biomechanist will look at technique. Then each discipline will collate their results, whereas in an interdisciplinary approach the biomechanist may work with a physiologist to look at technique changes due to fatigue (Burwitz et al. 1994). Multi-disciplinary research may be the result of a lack integration of sub-disciplines from the outset of sport and exercise science, and so it is harder to integrate then together when trying to bring about an inter-disciplinary approach to problem solving.

Multi and inter-disciplinary research are both ways of improving research and developing is away from mono-disciplinary work in sport and exercise sciences. The majority of sport and exercise research is mono-disciplinary (Burwitz et al 1994) which is when research looks solely at one sub-discipline and provides answers and conclusions from only that discipline. Both multi and inter-disciplinary approaches endeavour to link sub-disciplines, such as psychology and biomechanics, together to improve the ability to solve problems such as injury, fatigue and poor technique. Both approaches work in teams or groups (that include the sport and exercises scientists, coacher or practitioners and the athlete or patient) to combine knowledge and methods from their different areas.

Despite these similarities there are still major differences between the two stated approaches. The inter-disciplinary approach appears to be the best way to bring about improvements as it integrates the sub-disciplines which takes the form of 'bridge-building' (Squires et al 1975) which requires a combination of specialist knowledge from various disciplines focusing on a specific problem. Contrastingly, multi-disciplinary approaches collate rather than combine knowledge; therefore the sub-disciplines work separately during research processes before coming together to attempt to reach a conclusion about a stated problem (Burwitz et al 1994). It is also believed that an interdisciplinary approach will reveal potential conflicts between the sub-disciplines (Burwitz et al 1994). As there is immediate interaction between sub-disciplines, an opinion given by one area is disputed by another. This is less likely to occur in multi-disciplinary approaches as sub-disciplines do not work in direct contact with one another.

Despite the above examples no clear definition is given of the distinctions between the two approaches because many sport and exercise scientists have regarded multi and inter-disciplinary as synonymous terms (Burwitz et al 1994).

The professional experience was involved with sport science which Smith (2001) described as being characterised by collaborations with coaches and performance directors. It was first and foremost a biomechanical approach.

Biomechanics is a highly scientific and mathematical based sub-discipline, usually looking at technique, and problems with technique, as causes of problems such as injury and failure of achievement. Gymnastics is a sport that utilises these methods frequently as it is a very technical sport where injuries can be common. This is due to the fact that gymnastics encompasses a seemingly endless quantity of movement skills (George 1980). During the professional experience questions were put to the researcher regarding the involvement of other sub-disciplines to determine the dimension of the research. These questions were: 'are there any sport scientists or performance director present for sub-disciplines other than biomechanics to help assess the primary information gathered from the research?' 'Will the results of the research be collated with other sub-disciplines and fed back to the performer?'

From the answers given to these questions it was concluded that the research being carried out was mono-disciplinary as there was no interaction, in any way, with other sub-disciplines. As discussed above there is an increasing need from multi or inter-disciplinary research in sport and

exercise science, this study may have been improved by the introduction of other sub-disciplines and the feedback given to an athlete would have increased in value.

The research itself was looking at the approach and take off of the gymnast during the vault, as well as having technique assessed biomechanically, the researcher may have advised the athlete to be assessed by a physiologist or physiotherapist, this may produce results that show differences in muscle pair which could lead to injury, for example one calf being larger than the other, which could mean production of force at take off is unbalanced. This could then be fed to the biomechanist who has also found that during takeoff the gymnast has been unbalanced and therefore the athlete would need to undergo strengthening in the shorter calf to get it up to a similar size to the other calf.

This would create a multi-disciplinary approach as sub-disciplines of sport science will have collated data after the research to improve feed back to the performer.

It may also have been helpful to have had a psychologist present at the time of testing who had watched the subject in competition and seen if their routine or performance differed between in and out of competition performance. It may be possible that the pressure of performing in competition had led the athlete miss time a move which led to a decrease in performance; the psychologist could then work with the performer to help improve confidence during competition and therefore improve the athlete's performance.

This would create an inter-disciplinary approach as sub-disciplines of sport science will have integrated during research to improve feed back to the performer.

If the approach's dimension was changed to either a multi or an inter-disciplinary approach it will give the gymnast a much better chance of improving performance in competition.

The professional experience undertaken was shown to be mono-disciplinary as it was a piece of research focusing solely on the biomechanics of the approach and take off of the gymnastics vault. As discussed above introducing further dimensions to the research may have been more beneficial to the athlete as they may receive more feedback. However the piece of research was an undergraduate study which had a primary focus on biomechanics and introducing other sub-disciplines may have confused the findings and taken away from the aims of the research. This essay has described multi and inter-disciplinary approaches within sport science and described their application within a sporting context.