PGTA Project Proposal

Discipline:	Biomechanics and Motor Control
Project Title:	The effect of pole length and pole stiffness on performance and technique in pole vault
Supervisory Team:	Dr Glen Blenkinsop Dr Sam Allen
Summary of proposed project:	Pole vault athletes progress through many different poles of varying lengths and stiffnesses while mastering the event, eventually converging on a relatively small number of poles with marginally different lengths and stiffnesses as they reach the peak of their athletic careers. Although vaulters may have a preferred pole to warm-up on or to start a competition on, they can often choose to select another pole during a competition depending on the weather or their physical capacity on that particular day. In selecting different poles a vaulter may decide to change the stiffness of the pole or they may decide to hold a little higher or lower, either on the same pole or on a different pole. Presently, the selection of a pole may be made, after consultation with a coach or advisor, based on relatively subjective means, such as how a particular vault feels, how much a pole bends on previous vaults, or on the high point of the vaulter on previous attempts at a vault. In all cases, this decision must be made in light of the vaulter's usual technique and performance, with some estimation on how this may be affected by changing the pole. The purpose of this project would be to better understand how an athlete's performance and technique can be affected by vaulting on poles of differing lengths and stiffnesses to assist valuters and coaches during this decision-making process. The proposed project would examine several vaulters during vaults of various run-up lengths using poles of various lengths and stiffness. Kinematics would be collected initially using 2-3 cameras with manual digitisation, leading to a larger data collection using a 3D motion analysis system (Vicon). In addition, a simple mathematical model can be constructed to investigate this issue from a theoretical point, providing predications that can be verified from experimental data. With further work this may lead to the development of a 3D musculoskeletal forward dynamics model of the pole and pole vaulter system to enhance the investigation.
Required skills, experience, and/or education:	Applicants should have at least a 2:1 Honours degree (or equivalent) in sport science (with a large component of biomechanics), physics, engineering, mathematics or a related subject. A relevant Master's degree and/or experience in one or more of the following will be an advantage: computer simulation modelling (OpenSim, AnyBody, Visual3D, etc.), 3D motion analysis (Vicon, Qualisys, etc.), applied sport science support.
Link to School research theme:	Sport Performance