

## **Guidelines for Supervised Experience**

### **Biomechanics Section**

#### **Introduction**

BASES have recently decided to alter the guidelines given to students registered for supervised experience. The general feeling is that the guidelines provide too little information to be helpful.

The Psychology section made the initial changes to the SE guidelines for their students. Students were assessed on a number of competencies each related to specific aspects of sport psychology. Only when students were deemed to be competent in each specified area was the supervised experience process complete. A fully competent person would then be in a strong position to apply for Sport Psychology accreditation.

The Biomechanics and Physiology sections have since followed suit and developed a competency list of their own. What follows is a specific list of competencies against which students registered for SE experience in biomechanics will be assessed annually. This system will be used to guide the student's learning experience, so that BASES accreditation is an almost automatic process on completion of the SE period.

#### **Specific Biomechanics Competencies**

Work in the area of biomechanics can be categorised broadly into four areas:

1. The analysis of human motion
2. The analysis of forces
3. The analysis of muscle recruitment patterns
4. The analysis of muscular performance

With, in addition:

5. The ability to work with and communicate to various client groups.

It is envisaged that the supervisee will be assessed annually on their progress to achieve competency. In the annual report, each area will be rated on a scale of 0-5 (0 = no experience, 5 = autonomous competency). Specific comments should also be made for each area commenting on the strengths of the supervisee, identifying which aspects specific need further development and how this will be achieved (i.e. attendance at specific workshops, laboratory experience etc).

An accredited biomechanist should have a basic knowledge of all of these analyses types, but an in depth knowledge of only one is necessary to perform a research study or provide a sport science support service, and therefore achieve accredited status. It is therefore more important for supervisors to lead their students towards a competency rating of '5' in one area than trying to achieve moderate ratings in all four areas.

To assist the competency rating process, the factors that constitute a rating of '5' are given for each area:

#### **1. The Analysis of Human Motion**

This area normally relates to an individual's ability to perform a film analysis of human movement. To achieve an autonomous competency rating of 5 the individual should be able to demonstrate:

- Knowledge of the BASES Code of Conduct and Biomechanics Guidelines for the analysis of human motion.
- Ability to conduct qualitative analysis of video.
- Ability to construct and validate hierarchical technique models to support qualitative and quantitative analysis.
- Appropriate selection of the filming modality (video or on-line system).
- Adherence to accepted filming protocols (2-D and 3-D methods) such as those outlined in the BASES Biomechanics Guidelines.
- Understanding of the limitations of 2-D and 3-D filming protocols.
- Use of the appropriate protocol to study the given movement.
- Understanding of data smoothing and filtering methods and use of the appropriate reduction technique.
- Understanding of how kinematic parameters are calculated from co-ordinate data.
- Understanding of the data obtained and its relevance to the performed task.
- Experience and competency in collecting, processing, interpreting and communicating motion-related data, in accordance with the BASES Code of Conduct and Biomechanics Guidelines, and at a level that meets the criteria of a peer-reviewed scientific publication.

## **2. The Analysis of Force**

This competency will normally relate to an individual's ability to conduct a force platform analysis of a sport or exercise activity but may also relate to the use of pressure measurement devices such as pressure insoles and pressure platforms. To receive a competency rating of 5 the individual should be able to demonstrate:

- Knowledge of the BASES Code of Conduct and Biomechanics Guidelines for force data collection.
- Understanding of the performance characteristics and limitations of each component of the force/pressure measurement system (e.g. hysteresis, linearity, cross talk, frequency response, sampling frequency, resolution) and the methods used to calibrate the system.
- Understanding of each of the kinetic and kinematics parameters that can be derived from force data (e.g. centre of pressure, moments of ground contact force, angular moments, power, loading rates) and the computational procedures involved.
- Understanding of the methods used to synchronise a force system with a motion analysis system (e.g. video) to enable an inverse dynamics analysis to be performed.
- Understanding of the joint segments parameters that can be derived from force data (e.g. joint moments, force powers), the computational procedures involved and the inherent limitations.
- Experience and competency in collecting, processing, interpreting and communicating force or pressure data in accordance with BASES Code of Conduct and Biomechanics Guidelines, at a level that meets the criteria of a peer-reviewed scientific publication.

## **3. The Analysis of Muscle Recruitment Patterns**

This area normally relates to an individual's ability to successfully perform an electromyography (EMG) study to analyse muscle recruitment patterns. To receive a competency rating of 5 the individual should be able to demonstrate:

- Knowledge of BASES Code of Conduct and Biomechanics Guidelines for EMG data collection.
- Appropriate selection of EMG recordings system (e.g. electrode type, hard wired, telemetry or data logger, knowledge of amplifier characteristics).
- Adherence to accepted data recording protocols (e.g. subject preparation, electrode location and orientation, choice of sampling frequency).
- Understanding the limitations of electromyography (e.g. need for synchronisation to 'motion analysis', cross-talk, reproducibility of EMG).
- Use of the appropriate protocol to study the given situation (e.g. appropriate selection of muscles).

- Understanding of different data processing (both time and frequency domain) and normalisation methods.
- Interpretation of the processed EMG's (in time and/or frequency domain) and in relation to the task performed.
- Experience and competency in collecting, processing, interpreting and communicating EMG data, in accordance with BASES Code of Conduct and Biomechanics Guidelines, and at a level that meets the criteria of a peer-reviewed scientific publication.

#### **4. The Analysis of Muscular Performance**

This area normally relates to an individual's ability to perform a modelling study when analysing the musculoskeletal demands of an activity. To receive a competency rating of 5 the individual should be able to demonstrate:

- Knowledge of the BASES Code of Conduct and Biomechanics Guidelines for muscle modelling and isokinetics testing.
- Understand the uses and limitations of isokinetics and other dynamometers for the assessment of muscle function.
- Understand the different interpretations of torque-angle plots and the affect of test modality on the results produced.
- Select appropriate methods of musculoskeletal system for the analysis of human movement
- Understand the limitations and assumptions inherent in such models and their importance of model validation.
- Interpret and explain the results of simulations conducted using biomechanical models.
- Experience and competency in collecting, processing, interpreting and communicating muscular performance-related data, in accordance with the BASES Code of Conduct and Biomechanics Guidelines, and at a level that meets criteria of a peer-reviewed scientific publication.

#### **5. Communicating with Clients**

This relates to how the individual works alongside their clients. To receive a competency rating of 5 the individual should be able to demonstrate:

- Ability to research and be resourceful using a holistic approach.
- Understanding of the importance of conducting a 'needs analysis'.
- Ability to develop appropriate interventions based on the client's 'needs analysis'.
- Strong interpersonal skills that are effective with the client and aid in building a rapport.
- Understanding how to work professionally and with high standards.
- Ability to feedback results in the client's language and in a variety of ways (short report, presentation, verbal discussion) in an effective manner for the client.
- Performance of all work with a 'Quality Assurance' that entails self-evaluation and subsequent improvements in practise.
- Ability to perform the above in accordance with the BASES Code of Conducts and Ethical Practice.

These prerequisites are provided explicitly because it is the section's view that all accredited biomechanists should be able to conduct scientific studies confidently and capably, for the purpose of research or support, and not just be able to follow a testing protocol.