Reasoning of dissertation topic and competency of potential supervisor for admission into LSU biology doctoral studies with a participation of Tartu university 2024

Area of research (title and code)	**Biomedical sciences B000**
Field of research (title and code)	**Biology 01B**
Topic of research	**Underlying Biomechanical Mechanisms of Skill Acquisition**
Institution	**Institute of Sport Science and Innovations**

Potential supervisor

Pedagogical and scientific degree	**Name, surname**	**Academic position**
PhD	Gal Ziv	Senior researcher

Short reasoning of proposed dissertation topic

Title
The Effects of Various Learning Strategies on Golf Club Kinematics and Biomechanical Mechanisms Related to Skill Acquisition in Golf
Short research description (including aims and objectives) (maximum 1500 characters). The objective of the research topic is to investigate the effects of various motor learning strategies on the effectiveness and efficiency of performance in the process of motor skill acquisition in golf. We specifically aim to find out the relationships between efficiency of movement (through kinetic and kinematic variables) and task performance. It is important to distinguish between effectiveness, which refers to changes in behavioral outcomes or task performance, and efficiency, which pertains to changes in underlying mechanisms leading to altered outcomes or improved performance. While the motor learning literature extensively covers studies on effectiveness, research on efficiency measures is comparatively limited. Incorporating efficiency measures is essential to comprehensively understand how learning strategies influence skill acquisition[1]. In this project, we will examine how learning strategies such as autonomy support, errorless learning, types of feedback, and gaze control affect performance, learning, and efficiency of movement in three types of golf shots – drive, pitch, & putt. Efficiency will be assessed by recording golf club kinematics and the participants' center of pressure, balance, and force distribution. We aim to elucidate the effects of learning strategies on both the effectiveness and efficiency of motor skill acquisition in an ecologically valid, real-life, complex task.
Relevance of the problem, its novelty at national and international level (maximum 1500 characters). One challenge in motor learning is the lack of clarity regarding how teaching strategies contribute to the performance of complex tasks. Many learning strategies proposed to enhance performance and motor learning have primarily been tested on simple tasks that may not represent the

[1] Anderson, D. I., Lohse, K. R., Lopes, T. C. V., & Williams, A. M. (2021). Individual differences in motor skill learning: Past, present and future. *Human Movement Science*, *78*, 102818.

complexities of real-life tasks encountered in domains such as sports, aviation, and music[2]. Furthermore, the reasons certain strategies are effective while others are not remain unclear due to problems in replicability, publication bias, and small effect sizes, as reported in various meta-analyses[3,4], hindering the development of robust theories.

As a result, teachers, coaches, and therapists who instruct motor skills may struggle to rely on such studies to improve their teaching strategies. This is unfortunate because skill acquisition specialists, armed with relevant scientific knowledge, can offer valuable insights to enhance teaching. By understanding the underlying biomechanical mechanisms associated with performance, we hope to provide practitioners with more evidence-based practical suggestions.

This topic has national and international implications, as motor learning is a fundamental requirement across a diverse range of domains and professions, transcending geographical boundaries. Indeed, most human activities involve some motor actions. Therefore, advancing our understanding of motor learning mechanisms and effective teaching strategies can profoundly impact various domains.

[2] Wulf, G., & Shea, C. H. (2002). Principles derived from the study of simple skills do not generalize to complex skill learning. *Psychonomic Bulletin & Review*, *9*, 185-211.

[3]McKay, B., Yantha, Z., Hussien, J., Carter, M., & Ste-Marie, D. (2022). Meta-analytic findings of the self-controlled motor learning literature: Underpowered, biased, and lacking evidential value. *Meta-Psychology*, *6*.

[4] McKay, B., Hussien, J., Vinh, M. A., Mir-Orefice, A., Brooks, H., & Ste-Marie, D. M. (2022). Meta-analysis of the reduced relative feedback frequency effect on motor learning and performance. *Psychology of Sport and Exercise*, *61*, 102165.