This seminar is part of our EARLI and Johan Jacobs Foundation Emerging Fields Group (EFG) seminar series “The potential of biophysiology for understanding learning and teaching experiences” (BioL&T) organised by Lars-Erik Malmberg (University of Oxford, UK), Tim Mainhard (Utrecht University, The Netherlands), Eija Pakarinen (Univeristy of Jyväskylä, Finland), Lucia Mason, Sara Scrimin (Univeristy of Padova, Italy), Andrew Martin, and Joel Pearson (University of New South Wales, Australia). We welcome all to our second seminar in Oxford, UK, titled:

**Physical Activity and Rest,** **Thursday 6th June 2019**

Registration Form: *Please return to* [*charlotte.trevillion@education.ox.ac.uk*](mailto:charlotte.trevillion@education.ox.ac.uk) *by Wednesday 29th May, or earlier if you can.*

Name……………………………………………………………………………………………………….

Institution/Department………………………………………………………………………………………

Estimated arrival time………………………………………….

Estimated departure time…………………………………..

Contact email…………………………………………………………………………….

We will provide refreshment and lunch during the day. Please note any dietary requirements:

………………………………………………………………………………………………………………………

Please note any access requirements:

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Poster Submission:

You are invited to bring a poster to the conference to present on-going biophysiological work. Insert a title and an abstract below.

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Short talks/presentations:

If you would like to give a short talk (up to 20 minutes) in the 16-17 slot, please provide a title and short abstract. This could be on a substantive or technical aspect, probing next steps of the seminar series, or as a response to any of the presentations.

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Pub/Restaurant drinks/dinner:

We will book a table at a local pub/restaurant around 19.00 for drinks/dinner. Would you like to join Yes / No (This event is an add-on, not covered by the EFG)

Bursaries:

There are some bursaries available at our discretion. Please send a short description of your financial needs and expected travel and accommodation expenses, which you are not able to claim elsewhere, and send these to Lars-Erik Malmberg ([lars-erik.malmberg@education.ox.ac.uk](mailto:lars-erik.malmberg@education.ox.ac.uk)).

**Keynote Speakers:**

We are pleased to provide more detailed information about the three keynote presentations.

***Professor Vincent van Hees, Netherlands eScience Center.***

The central theme of Vincent’s work has been the development of algorithms to process data from wearable movement sensors as used for population research on human behaviour, including sleep and physical activity.  Vincent holds a PhD in Epidemiology from the University of Cambridge after which he did a post-doc at Newcastle University. At the Netherlands eScience Center, Vincent’s current focus is on novel approaches for time series and sensor data analysis. Vincent translated his expertise in an open source R package GGIR ([vignette](https://cran.r-project.org/web/packages/GGIR/vignettes/GGIR.html), [github](https://github.com/wadpac/GGIR" \t "_blank)), which has so far been used in over 60 peer-reviewed publications.

Title: Measurement of physical activity and rest using R-package GGIR

Abstract: The emergence of raw data accelerometry in research has provided the opportunity to collaborate more easily across research disciplines. However, the raw data collection also introduced a need for effective tools to process this kind of data. In this talk I will present R package GGIR and present an overview of how it works and motivate the main decisions that were made. I will cover: error reduction, decisions on how to aggregate the data, meaningful segmentation of the time series, and the sustainability of open source software tools like GGIR.

***Dr Elina Ketonen & Visajaani Salonen, University of Helsinki, Finland***

Dr. Elina Ketonen is postdoctoral researcher in Educational Psychology at the Faculty of Educational Sciences, University of Helsinki, Finland. Currently, Elina Ketonen is a Visiting Postdoctoral Research Fellow at the Department of Education, University of Oxford. She has used both cross-sectional, longitudinal and experience sampling datasets in her research and a wide variety of statistical methods, such as variable- and person-oriented approaches, multilevel modelling and intraindividual analyses. Most recently, she has started to examine the biophysiological correlates of students’ self-reported experiences by combining biosignal data with experience sampling data.

Visajaani Salonen’s background is as a mathematics teacher in a comprehensive school and a vocational school. He is currently working as a project planner (methodology specialist) in the *Centre for Education Assessment* as part of the Faculty of Educational Sciences in the University of Helsinki. His focus in the *Mathrack*-project is to assist in data collection and handle technical equipment. The third project, mainly concerning physiological data analysis, is *Bridging the GAPS*-study lead by Katariina Salmela-Aro and Kirsti Lonka. His other specialities are also general data processing, item response modelling and statistical analysis. Visajaani is a PhD student supervised by Markku Hannula. The PhD research is concerning modelling problems for nationally large datasets from different decades.

Title: From raw biosignal data to user friendly data for experience sampling studies

Data processing is an important part of studies dealing with biophysiological sensors (e.g., activity/gravity, heart rate). Depending on the set frequency (Hz) of the sensors, we accumulate large amounts of raw data (e.g., 100 Hz gives 100 reports per second). For commercial products the raw data contains little or no information about how to process the data, as such algorithms can be protected by business secrecy. Visajaani Salonen’s task as a methodology specialist is to manipulate raw-signals or company manipulated data into an aggregated format to preserve as much information as possible about the participant and his or her activity or heart rate. In this presentation we describe how we collect, manage and process biosignal data to link with experience sampling method (ESM) data in the “Bridging the GAPS “study carried out at the University of Helsinki. In total 139 Finnish secondary school students participated in the study, for two weeks.

We processed biophysiological data from Polar activity bracelets and FirstBeat health-monitoring sensors (two sensors applied to the chest). The Polar bracelet produces aggregated activity/sleep data in the form of Metabolic Equivalent of Task (MET) values for 30 second intervals. The FirstBeat health-monitoring device produces one-second interval data for heart rate and many additional variables pre-calculated from heart rate variability. FirstBeat also produces a list of RR intervals (intervals between successive heartbeats), serving information about participants’ level of stress and recovery. Data from both devices need to be aggregated into longer epochs in order to achieve a more reliable description of states of heart rate or activity.

An interesting, and largely unknown challenge is within which time-window we can merge self-reports from experience sampling with aggregated biophysiological measure. Would it be the experience (e.g., positive emotions at Time T) associated with a certain level of activity within a time-window that is five minutes wider (± 5 min) than the self-report, or would ± 10 min or ± 15 min be reasonable? In addition, what is the most efficient data analytic method to do this? We compare several data processing methods, for example time interval mean, standard deviation, Gaussian meaning [Costa, 2012], nonlinear dynamics [Voss, 2009] and continuous time-modeling [Voelke, 2012]) for aggregating physiological data to match the ESM time points. These procedures are possible to carry out using the R-statistical programming language. The testing of the different data-processing options as well as some preliminary empirical findings regarding biophysiological correlates of students’ self-reported experiences are presented in the seminar.

***Professor Helen Dawes and Dr Patrick Esser, University of Oxford Brookes***

Prof Helen Dawes and Dr Patrick Esser are active researchers in the centre for Movement, Occupation and Rehabilitation Sciences (MORES) at Oxford Brookes University. Dr Esser is a data scientist with a background in engineering, specifically looking at measurements of movement quality and quantity. He and his team are developing measures of Physical Activity based on accelerometry measurements, which can be used in both adults and paediatric populations. Prof Dawes, director and physiotherapist, is internationally renowned for running clinical exercise trials in both adult and paediatric populations with and without underlying conditions. She has recently conducted a study investigating physical activity, or lack thereof, in adolescents in mainstream schools across the UK in collaboration with the *Wellcome Centre for Integrative Neuroimaging* at the University of Oxford. More information can be found on the [MORES website](https://www.brookes.ac.uk/shssw/research/centres-and-groups/mores/).

Title: Objective measurements of Physical Activity in adolescents – a recent UK example in ~10K students

Current society is moving less and less, resulting in reduced fitness levels leading to detrimental health status as visible from increased obesity rates.  Recent reports have shown that 1 in 5 pupils in reception are overweight or obese. By year six, this has increased to ~35% of pupils making the UK one of the most obese and least fit countries in the world. The Government’s Childhood Obesity Plan for Action (2016) calls for the education and encouragement of healthy living and promotes the minimum of an hour of physical activity (PA) per day. However, children and adolescents are meeting these recommendations only in 18-27%.

Within this session, we highlight subjective and objective measurements of PA ranging from self-report diaries to the emerging trend of using wrist-worn accelerometers. We will discuss a novel analysis pipeline of PA, in addition to providing examples of applications within studies assessing (the lack of) PA in physical education classes in 100+ schools (~10,000 students) within the UK.

Aims and scope of our Emerging Field Group, “The potential of biophysiology for understanding learning and teaching experiences” (BioL&T)

Our EFG-team is a group of researchers interested in the potential role of biophysiology (e.g., heart rate, cortisol, electrodermal activity, physical activity and rest) in educational contexts. We are also interested in the situation-specific perceptions, beliefs and behaviours students and teachers have, and how these change from one situation to another. This is known as a “process perspective” (cf. intraindividual, within-person). Modern technology affords user-friendly and cost-efficient ways of collecting objective measures of biophysiology using unobtrusive wearable devices (e.g., heartrate monitors, accelerometers). The promise of such objective biophysiological measures is that - relative to existing “classic” approaches - they are considered more unbiased, allowing researchers to track processes as they occur in real time. Self-reports can straightforwardly be collected using experience sampling by apps on smartphones and tablets. Observations data can be coded in real-time using Saddler joystick-procedures. Importantly, these innovations make it possible to take traditional lab-based biophysiological measures into real educational settings. While some measures (e.g., movement) may have a direct value for educational research, other measures (e.g., heart rate) are usually seen as proxies for underlying psychological processes such as stress or other affective responses. Ultimately, using biophysiological measures will enable us to focus on how “mind” and “body” function in interplay in educational contexts in real-time.

The aims of our EFG are to

\* Support the transfer of classical lab-based physiological measures to real-life educational

settings and ambulatory assessment;

\* Enhance the psychological conceptualization of biophysiological measures in the

educational context;

\* Develop and accumulate the technical know-how to collect and prepare biophysiological

data;

\* Develop and accumulate the methodological and statistical knowledge about the specific

characteristics of biophysiological data and its analysis;

\* Develop guidelines for the implementation of biopsychological measures in educational

research and educational practice.

**Travelling to Oxford:**

By rail:

It is a 25-minute walk from Oxford train station (Park End Street, OX1 1HS) to 15 Norham Gardens (OX2 6PY).

Alternatively, you can take the 14/14a bus from the train station to Bevington Road and then walk across to Banbury Road and onto Norham Gardens.

There is also a taxi rank outside the station.

By plane:

Flights can be booked to London Airports (Heathrow, Gatwick, Luton, City) and will then require a transfer from the airport into the city centre/Norham Gardens. National Express buses run from these airports and this can be booked online : <https://www.nationalexpress.com/en>.

By car:

There is limited parking at the department and along Norham Gardens. Please contact the department reception if you require a car parking permit.

**Staying in Oxford:**

There are lots of hotels to choose from in Oxford. Some hotels that we can recommend would include:

Bath Place Hotel

Royal Oxford Hotel

The Buttery

Cotswolds Lodge

There are sometimes rooms available in Oxford University colleges, which can be found online.

If you need more information about travel and accommodation please get in touch with [charlotte.trevillion@education.ox.ac.uk](mailto:charlotte.trevillion@education.ox.ac.uk).