

## KLIC Activity Scenario Template

### TEACHER and STUDENTS NOTES

Activity title:

**Gymnastics, motion analyses , Handstand – forward roll**

Subject:

**Sport Didactics, Gymnastics, Physical Education Teacher Training Programme, 4<sup>th</sup> semester of**

Student age:

**>19 Teacher students**

Estimated duration:

90 + 90 min

#### **Phase 1 (Stage 1 – 2): 90min (gym/sport hall)**

- 20 min: Introduction. Purpose and learning objectives are presented. Brief presentation of the software to be used (KLIC and Skill Capture). Presenting technology tools to be used (laptop, DV Cam, Accelerometers) Grouping. Roles and responsibilities are distributed. Time for questions is given. Introduction could be shorter if the students took part in previous introductions of the both systems. In this case, create smaller groups and work with several try outs to select the most appropriate motion to save and analyze. It's also possible to add a body sensor to the setting.
- 10 min: warm up + pick and set up equipment
- 15 min/group and “station” x 4 = 60 min

#### **(Stage 3) Between phase 1 and 2 students are required to:**

- Download personal video from the Skill Capture Software
- Convert it into a Quicktime file and make a 6 picture sequence (see below)
- Fill in the motion analysis chart (See below)

#### **Phase 2 (stage 4 – 5): 90 min (classroom with Internet access, computers, presentation tools)**

- 15 min: feedback and recapturing
- 45 min: group work to conduct further data analyses and discuss and compare motion analysis chart. Make a short 1 – 2 slide presentation
- 30 min group discussion and presentations of motion analyses

Science content

#### **Sport didactics and biomechanics**

The didactic questions form the basis for a critical analysis of the use of technology for measuring acceleration and video feedback

Learning objectives

1. Students should be able to perform a handstand – forward roll
2. Students should be able to conduct a motion analysis using the Skill Capture System (video recording) to explain the general concept of an ideal movement
3. Students should be able to explain how gravity “creates” the movement

4. Students should be able to explain the difference between the hands and feet acceleration in the movement?
5. The student should be able to explain where and why the greatest acceleration occurs by studying the graphs of y and x.
6. Students should be able to understand and explain acceleration of the movement is expressed in x, y and z-axis by interpreting the graphical interface of the KLiC system together with Skill Capture video recording of the movement.
7. Students should be able to show a deeper understanding of the basics of acceleration in biomechanics by formulating a research question based on acceleration and its impact on the performance of a handstand - forward roll
8. The students should be able to critically define the advantages and disadvantages of the use of video feedback and the accelerometers in gymnastics

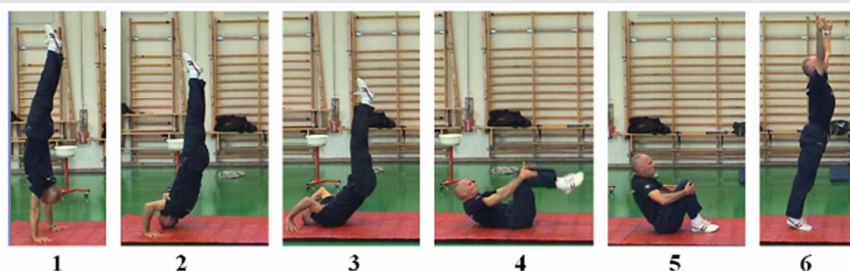
### Inquiry-based character

**Stage 1:** Work in groups of 6 – 8 students. Allocate roles and responsibilities within the group as shown below:

**Roles and responsibilities:**

4 Demo gymnasts (DG)  
2 Technicians (T)  
2 Coaches for spotting (C)

- A. Lap top start up with KLiC System Software (T)
- B. Apply the accelerometer sensors at the ankle of the dominant leg (the leg used for up swing into handstand), wrist sensor on left hand.



**Figure 1** Ideal sequence

Resources:

Skill Capture (open source soft ware):  
<http://video4coach.com>

KLiC system software:

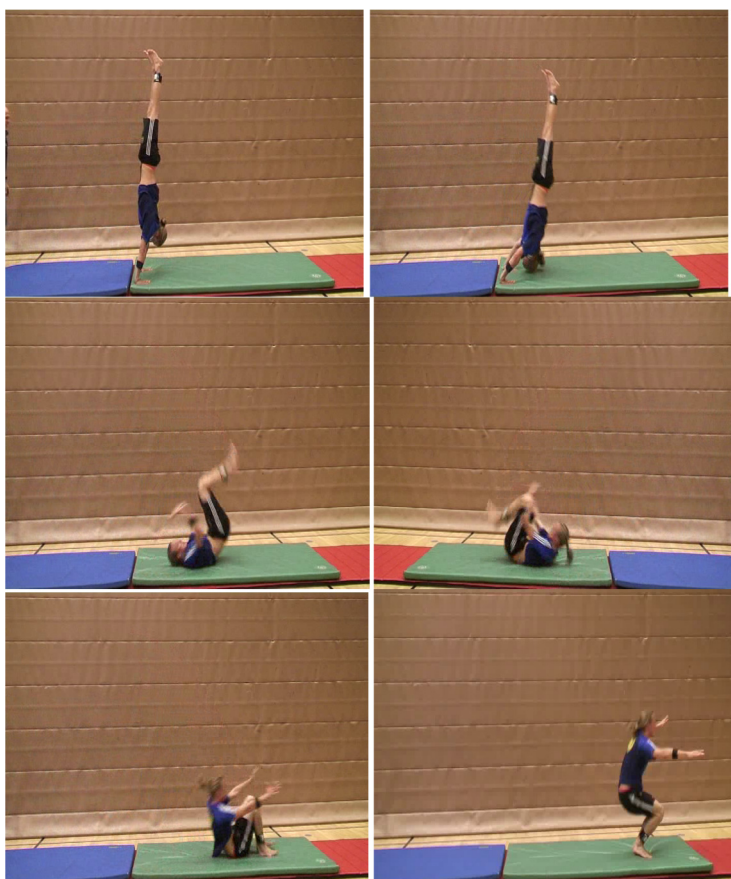
<http://www.fuger.at/files/markus/KLiC/python-2.6.6.msi>  
(14MB)

[http://www.fuger.at/files/markus/KLiC/KLiC\\_setup.exe](http://www.fuger.at/files/markus/KLiC/KLiC_setup.exe)  
(80MB)

Use various videos on YouTube to acquire understanding the what essential movement a handstand is in gymnastics, i.e:

- <http://www.youtube.com/watch?NR=1&v=iCdnBYhC-b0>  
(Basic handstand training)
- <http://www.youtube.com/watch?v=vbPMiOiPI6k&feature=related> (best of gymnastics 2010-2011)
-

- Note where each accelerometer is placed
- C. Check communication to the base station. (T)
  - D. Test 1: Execute a handstand – forward roll on the mat (DG)
  - E. Check if adequate data is sampled (T)
  - F. Start the Skill Capture system (DV Cam and laptop with software. Prepare motion capture in test 2. (T)
  - G. Test 2: Execute a handstand – forward roll on the mats (DG)
  - H. Check that video clip is stored and that KLiC data for acceleration is stored (DG + C)



**Figure 2 Student picture sequence for analyses**

### Stage 2

Define the lowest common denominator in the movement that contributes to a good technique. Study the Ideal picture sequences. Study the motion analysis scheme and develop one or two appropriate hypothesis i.e.

- Peak velocity - when and where?
- differences in acceleration in hand and foot?
- gravity force – impact on movement?

### Stage 3 Do home assignments :

- Download personal video from the Skill Capture Software
- Convert it into a Quicktime file and make a 6 picture sequence (see below)
- Fill in the motion analysis chart

Motion Analyses Scheme for students			
<i>To be highlighted</i>	<i>Extra training needed for Mark with X</i>	<i>Motion techniques analysis: Describe cause and effect</i>	<i>Proposal on oral feedback and assistance exercises</i>
Body Position hand-stand, center of gravity, size of support area, (Fig. 1)			
Initiation of downrolling, gravity, lever, torque (Fig 1-2)			
Technique in the early rolling phase (Fig 2)			
Technique in the mid to late rolling phase			
Technique in the transition between rolling and raising (Fig 5-6)			
Select or describe location of rotation point throughout the sequence			

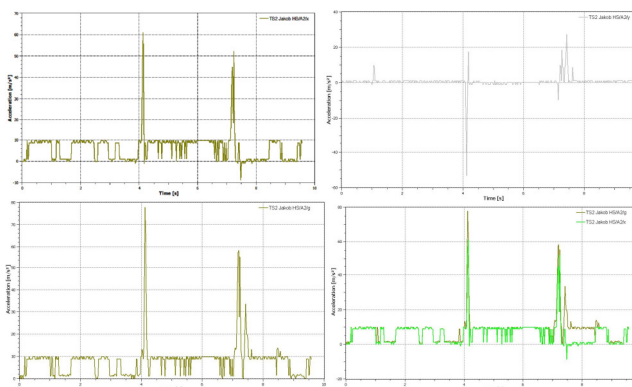
Figur 3 Body Position refers to the body's position relative to the room and / or equipment and posture

### Stage 4

Work in groups.  
Make further data analyses and discuss and compare the motion scheme with KLiC Data and Video sequences.

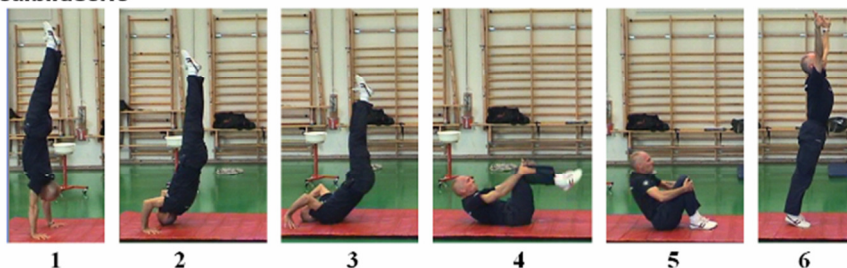
Prepare a presentation (i.e. ppt) with embedded video.

Students could, if they wish, add the video clip to YouTube, Wimeo or other open sources.



Figur 4 Accelerometer data Hand and foot

### Idealbildserie



Figur 5 Ideal sequence

### Stage 5 Presentation and group discussions.

A on-line course evaluation is available for all students with specific question concerning the systems used within this scenario.

Please, visit Vimeo for video demos of student works:

- <http://vimeo.com/32929763> (handstand)

### Applied technology (if any)

Digital video camera

### Materials needed

- Laptop with Internet Connection
- KLiC system Software
- Setting: gymnastic mat, video camera connected to the laptop (See guide at Skill Capture)

## Discussion guide

**Type of Learning:** Inquiry based learning utilising a collaborative structure with problem solving activities. Construct of questions, data analysis, comparisons

**Activity:** Collaborative in group

**Learning Sequence:** Define, explore, discuss, explore, discuss and redefine

**Establishing a common understanding-** Students are organised into groups and have different roles and responsibilities in a collaborative explorative learning environment.

**The experiment:** See guidelines for stage 1 - 4

**Conclusion, assessment and evaluation-** Each group should present their result with following discussions where their future professional role as PE teachers should be put in forefront.

Technology for enhanced learning and understanding.

Design discussion environment based upon the didactical key questions:

What, When, Where, Why, How, Who and for whom?

*Seven friends I have  
for whom I really care  
"What?" "How?" and "Why?"  
"When?" "Who?" and "Where?"  
Seven, aren't they supposed to be?  
"Whom?" is missing out on me?*

## Assessment

*On line course assessment for students.*



## STUDENT WORKSHEET

Activity title:

**Motion analyses in gymnastics using single bar: movement to study: stride rotation forward**

Introduction

*See learning objectives above*

Thinking about the question

*See notes above.*

Materials needed

*Laptop, DV cam, gymnastic single (high) barn*

Safety

*Routine safety in gymnastics. Look for suitable cable connection to avoid long cables on the floor.*

Investigation

*See learning outcomes*

Analysis (SWOT)

*Technology enhanced learning. SWOT after final presentation*

Further investigation

*Progression – where, when, what and how?*

Assessment

*Regular course assessment*