Virtual Experimental Activity of the *Bouncing Ball*

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Effectiveness of a computer Simulation

The 3 A's model (Redish, 2001)

Authentic
- **True educational topics**. Allows teaching contents that students are able to understand.

Adoptable
- **Easy to implement** by teachers, and **easy to explore** by students.

Adaptable
- **Easy to modify**, **flexible** and **integrable** in different contexts, to accomplish a certain didactic purpose.

Characteristics of a VEA

- ✓ **Identification** of relevant physical quantities

- ✓ **Interactive Engagement** (Heads-on , Hands-on)

- ✓ Involves **Variable Control**

- ✓ Allows **Data Collection** and/or **Graph Analysis**

- ✓ Use of **Virtual Measuring Tools**

- ✓ Recognition of **Uncertainties** in virtual measures; use of standard error theory

- ✓ **Exploration** can be extended outside the classroom

Student version

Teacher version

ACTIVITIES INDEX
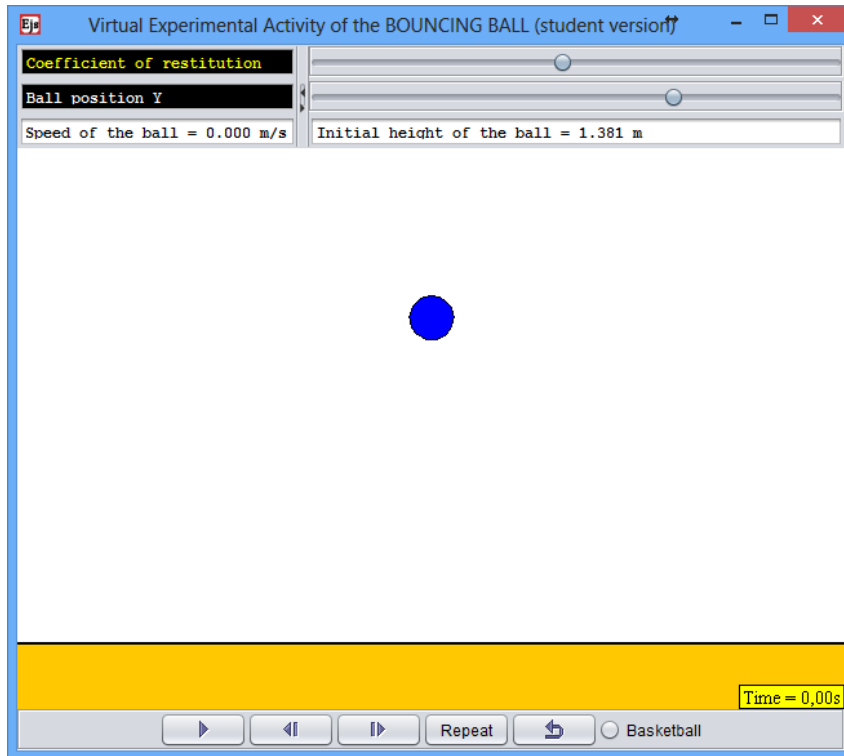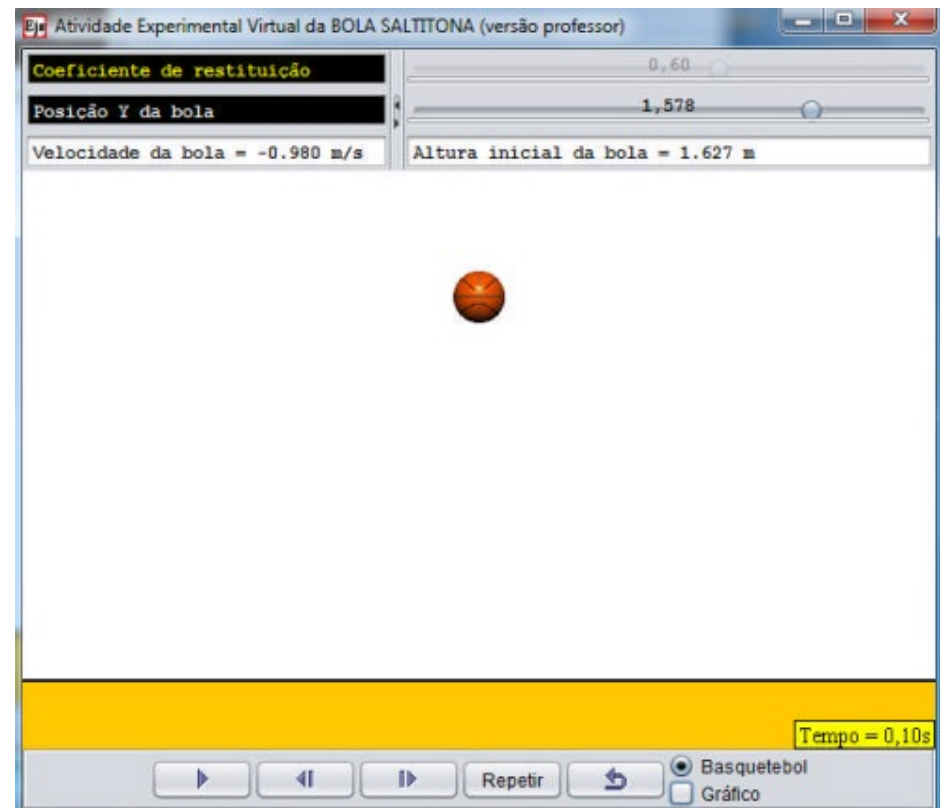
1. **INTRODUCTION / THEORY**

2. **Measurements & Uncertainties**

3. **ACTIVITY 1: Training Data Acquisition and Graphs**

4. **ACTIVITY 2: Kinematic study of a basketball's COR**

5. **ACTIVITY 3: Energetic study of a ball's rebound**

6. **ACTIVITY 4: Dynamic approach of a ball's free fall**

7. **Glossary**

8. **Help**

CONCLUSIONS

- ✓ Students can use VEAs **when they want**, **where they want** and **as many times as they want**

- ✓ VEAs promote **laboratory skills** like in real experiments (variable control, measuring tools, data collection, tables and graphs, critical reasoning)

- ✓ VEAs **complement** real experimental activities (<u>do not replace them</u>!)

- ✓ Can **substitute** real activities (danger, malfunction, …)

- ✓ Helps the **bridge** between <u>physical phenomena</u> and the <u>understanding of physics</u>

Thank You !