



Virtual Instrumentation Software – Comparative study (I)

Content:

- A. Introduction
- B. Criteria
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A. Introduction

One of the First Year Project tasks was to evaluate / compare the three kinds of software chosen for developing the process of training inside the Training Modules. Based on the partners experience in designing and developing virtual experience, the following software packages were selected: *Cabri Geometry II*, *LabVIEW*, *Crocodile Clips*. As the Project WorkPlan has foreseen in the first year the realisation of a comparative study on the previous mentioned VI environments, the partnership agreed to work on this important aspect having in view two important points of view: *pedagogical* and *technical*.

In order to process the needed data, a questionnaire designed by the Patras team has been conducted among the local coordinators and the course tutors. The Questionnaire proposed 10 criteria which are detailed below. The interviewee was to choose one of the five answers: *Not good*, *Weak*, *Middle*, *Good*, *Very good* for all the criteria. The answers were collected and the Bielsko-Biala team together with the Targoviste team elaborated this Comparative Study.

B. Criteria

The evaluation of the software was done with the respect to the following issues:

1. Usability

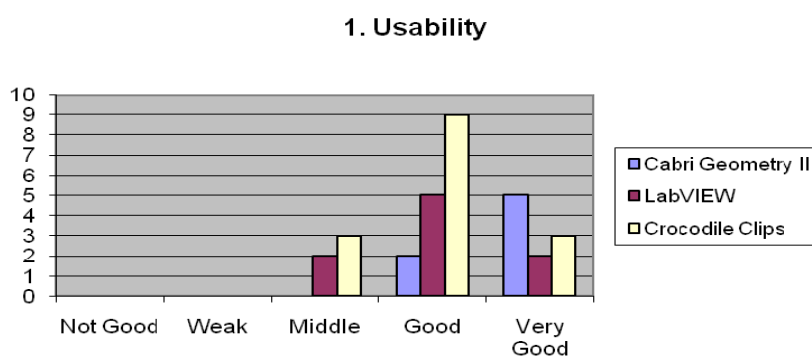


Figure 1. *Usability* criteria



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Cabri Geometry II



Figure 2. *Cabri Geometri II* Evaluation – *Usability* criteria

LabVIEW



Figure 3. *LabView* Evaluation – *Usability* criteria

Crocodile Clips

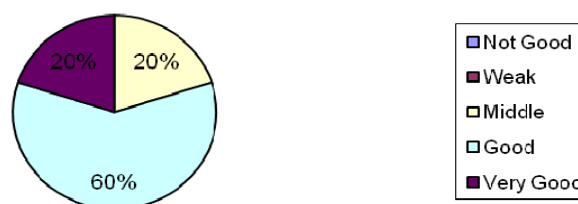


Figure 4. *Crocodile Clips* Evaluation – *Usability* criteria



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2. Collaboration

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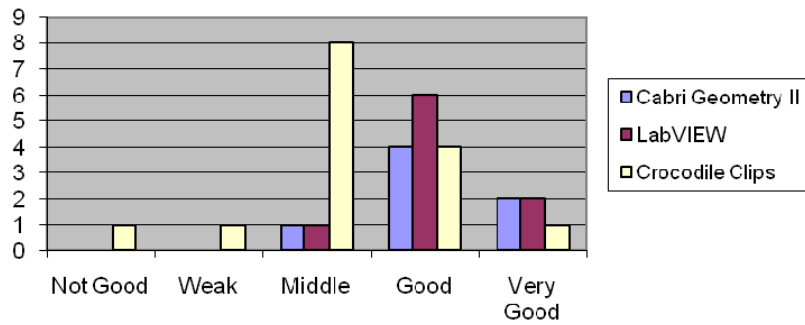


Figure 5. *Collaboration* criteria

Cabri Geometry II

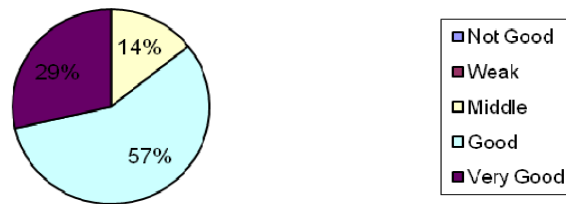


Figure 6. *Cabri Geometry II* Evaluation – *Collaboration* criteria

LabVIEW

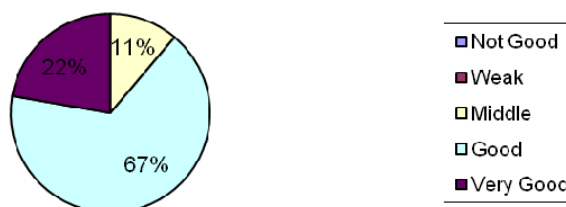


Figure 7. *LabView* Evaluation – *Collaboration* criteria



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Crocodile Clips

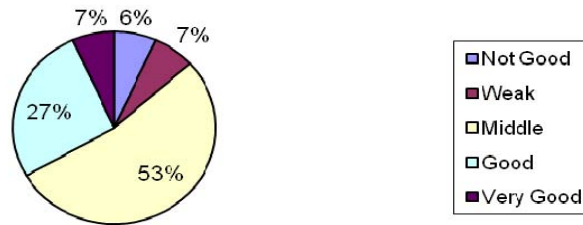


Figure 8. *Crocodile Clips* Evaluation – *Collaboration* criteria

3. Active learning

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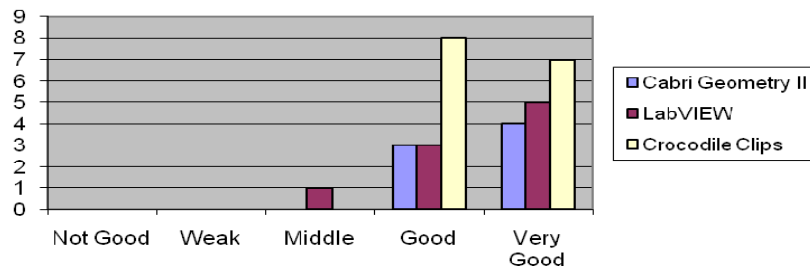


Figure 9. *Active learning* criteria

Cabri Geometry II



Figure 10. *Cabri Geometry* Evaluation - *Active learning* criteria



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LabVIEW



Figure 11. LabView Evaluation - Active learning criteria

Crocodile Clips

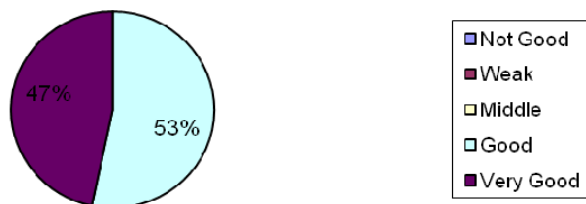


Figure 12. Crocodile Clips Evaluation - Active learning criteria

4. Expression of students' knowledge

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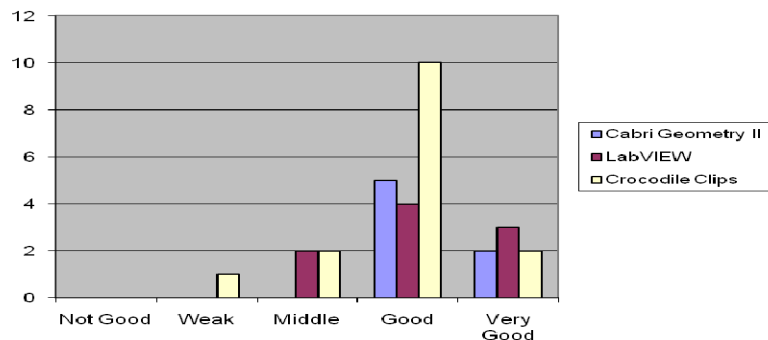


Figure 13. Expression of students' knowledge criteria



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Cabri Geometry II

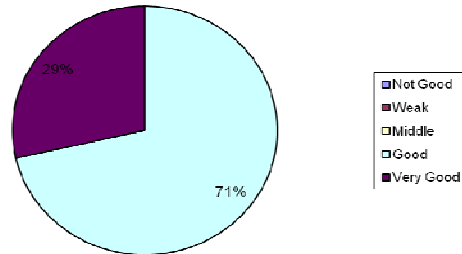


Figure 14. *Cabri Geometry* Evaluation - *Expression of students' knowledge criteria*

LabVIEW

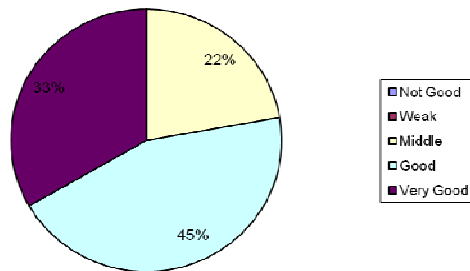


Figure 15. *LabView* Evaluation - *Expression of students' knowledge criteria*

Crocodile Clips

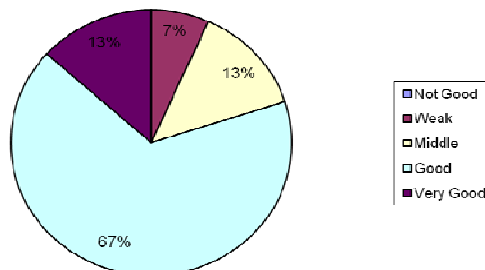


Figure 16. *Crocodile Clips* Evaluation - *Expression of students' knowledge criteria*



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5. Holistic approaches in learning

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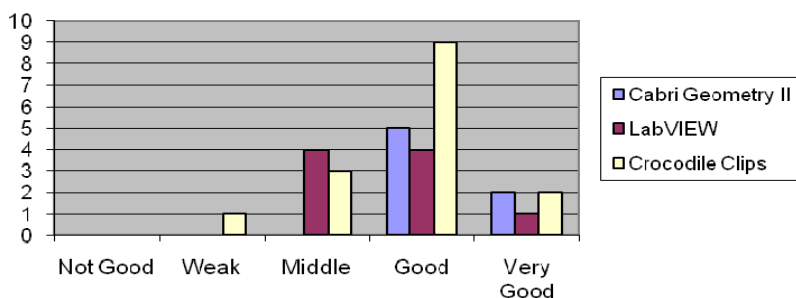


Figure 17. *Holistic approaches in learning criteria*

Cabri Geometry II

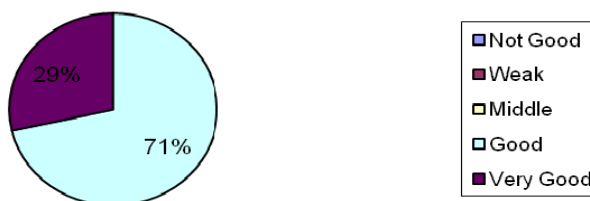


Figure 18. *Cabri Geometry Evaluation - Holistic approaches in learning criteria*

LabVIEW

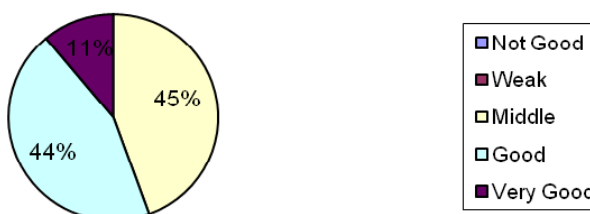


Figure 19. *LabView Evaluation - Holistic approaches in learning criteria*



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Crocodile Clips

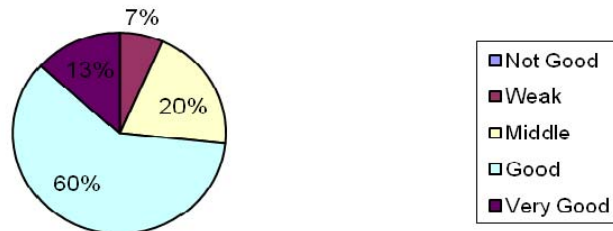


Figure 20. *Crocodile Clips* Evaluation - *Holistic approaches in learning* criteria

6. Interesting activities

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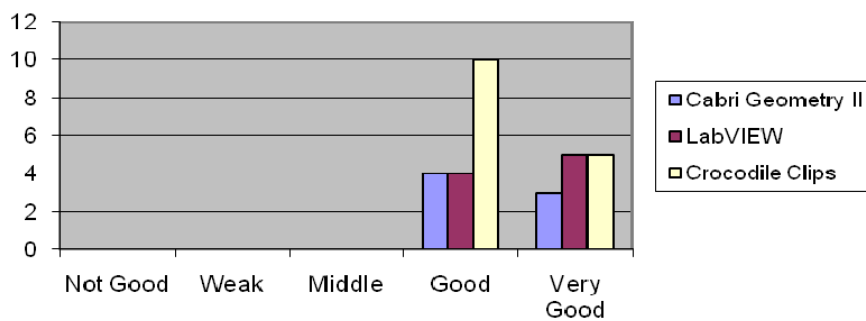


Figure 21. *Interesting activities* criteria

Cabri Geometry II



Figure 22. *Cabri Geometry* Evaluation – *Interesting activities* criteria



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LabVIEW



Figure 23. *LabView* Evaluation – *Interesting activities* criteria

Crocodile Clips



Figure 24. *Crocodile Clips* Evaluation – *Interesting activities* criteria

7. Promoting pupils' reflection

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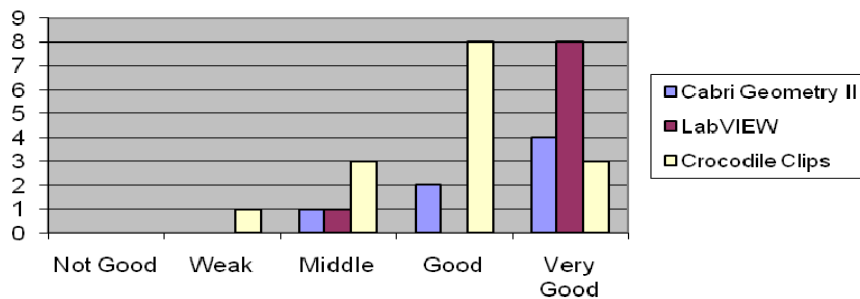


Figure 25. *Promoting pupils' reflection* criteria



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Cabri Geometry II



Figure 26. *Cabri Geometry* Evaluation - *Promoting pupils' reflection* criteria

LabVIEW



Figure 27. *LabView* Evaluation - *Promoting pupils' reflection* criteria

Crocodile Clips

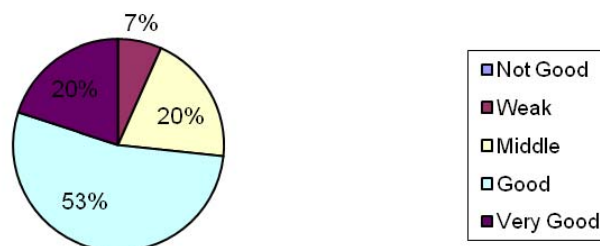


Figure 28. *Crocodile Clips* - *Promoting pupils' reflection* criteria



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8. Providing appropriate feedback

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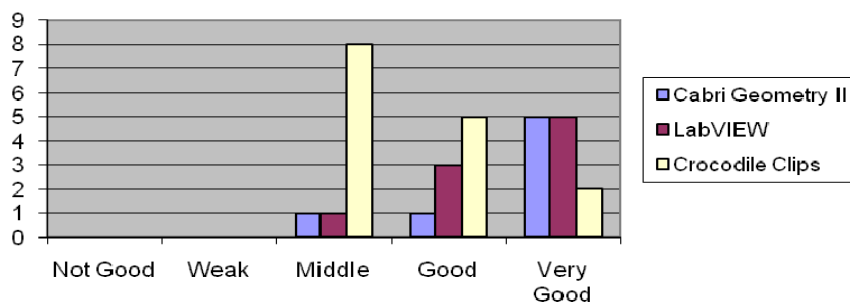


Figure 29. *Providing appropriate feedback criteria*

Cabri Geometry II

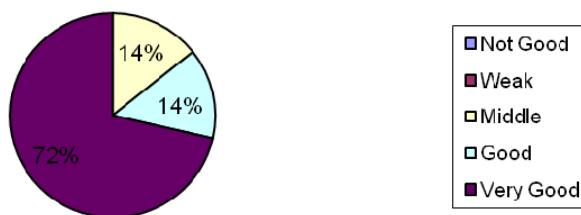


Figure 30. *Cabri Geometry Evaluation - Providing appropriate feedback criteria*

LabVIEW

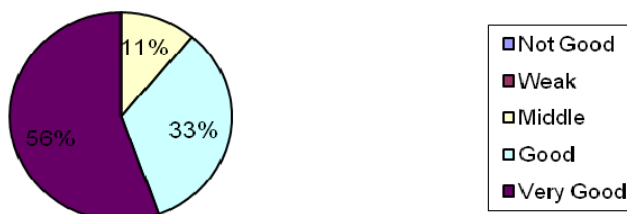


Figure 31. *LabView Evaluation - Providing appropriate feedback criteria*



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Crocodile Clips

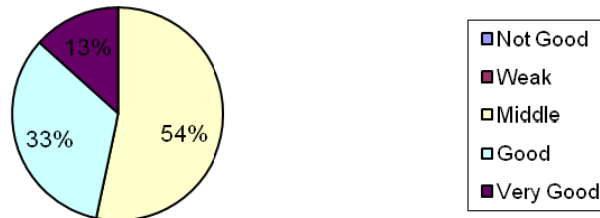


Figure 32. *Crocodile Clips* Evaluation - *Providing appropriate feedback* criteria

9. Designing various activities

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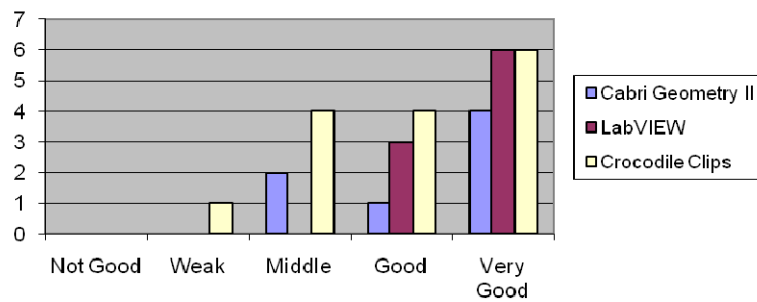


Figure 33. *Designing various activities* criteria

Cabri Geometry II



Figure 34. *Cabri Geometry* Evaluation - *Designing various activities* criteria



“Virtual Instrumentation in Science Education”

LabVIEW



Figure 35. *LabView* Evaluation - *Designing various activities* criteria

Crocodile Clips

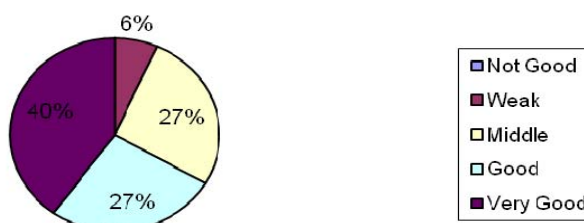


Figure 36. *Crocodile Clips* Evaluation - *Designing various activities* criteria

10. Concept/content teacher

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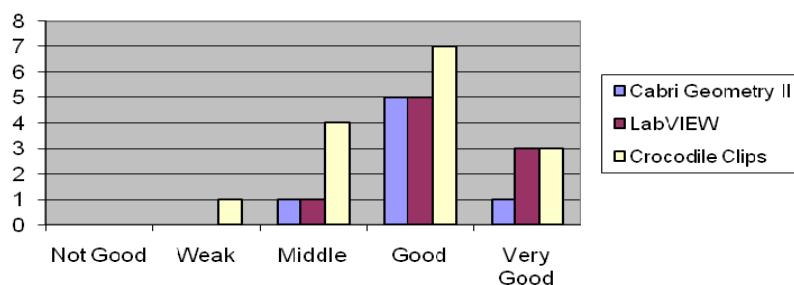


Figure 37. *Concept / Content* criteria



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Cabri Geometry II

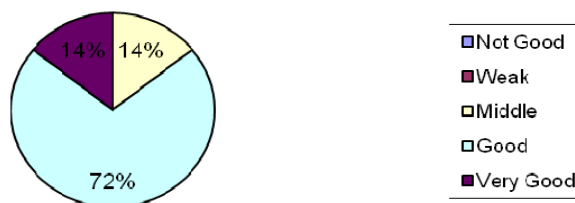


Figure 38. *Cabri Geometry* Evaluation - *Concept / Content* criteria

LabVIEW

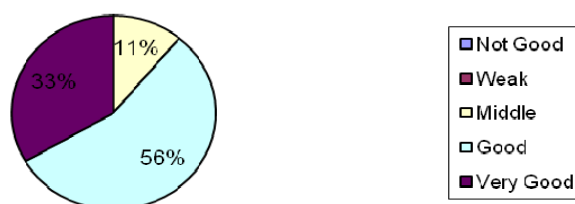


Figure 39. *LabView* Evaluation - *Concept / Content* criteria

Crocodile Clips

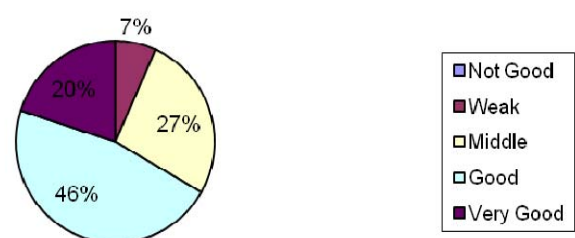


Figure 40. *Crocodile Clips* Evaluation - *Concept / Content* criteria

**“Virtual Instrumentation in Science Education”****C. Results**

Assuming percentage as a ratio of the “*Very Good*” answers (over 50% of them for a given criteria), the strengths of the respective software can be stated. On the other hand, the ratio of the weaknesses is more than 25% of the negative answers (*Middle, Weak, Not good*) for a given criteria:

	Strengths	Weaknesses
Cabri Geometry	usability, active learning, promoting pupils' reflection*, providing appropriate feedback*, designing various activities*	designing various activities
LabVIEW	active learning, interesting activities, promoting pupils' reflection, providing appropriate feedback*, designing various activities	holistic approaches in learning
Crocodile Clips	active learning**, concept/content teacher**	collaboration, promoting pupils' reflection, providing appropriate feedback, designing various activities, concept/content teacher

(*) a big opinion differentiation

(**) those criteria have the biggest percentage of “*Very good*” answers, nevertheless they are not predominant

Using the above ratio, software which stands out with respect to the following aspects can be indicated:

Criteria	Software
usability	Cabri (71%)
collaboration	Cabri (29%)
active learning	Cabri (57%)
expression of students' knowledge	LabVIEW (33%)
holistic approaches in learning	Cabri (29%)
interesting activities	LabVIEW (56%)
promoting pupils' reflection	LabVIEW (89%)
providing appropriate feedback	Cabri (72%)
designing various activities	LabVIEW (67%)
concept/content teacher	LabVIEW (33%)

Summing up: out of the software presented, most appreciated are *Cabri Geometry* and *LabVIEW*. *Crocodile Clips* takes the third position.

A similar conclusion can be drawn on the basis of the overall evaluation of the software. It is favorable: ‘*Good*’ answers dominate (46%) as well as ‘*Very good*’ answers (34%), few (about 2%) are less than ‘*Middle*’ and concern *Crocodile Clips*. In the overall evaluation, *Cabri Geometry* with 92% takes the first place, *LabVIEW* with its 85% takes the second place and *Crocodile Clips* with its 72% takes the third place.



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D. Conclusions

After the VI software evaluation and the tutors signalization of some *Crocodile Clips* problems, during the Gijon meeting it was decided to evaluate, for the second edition of the *Virtual Instrumentation in Science Education* course, two new different software materials - freeware both of them -: *GeoGebra* (mainly oriented to Algebra and some parts of Physics), and *Models Creator* (only oriented to Physics). After a new VI software evaluation, it will be decided if they are suitable for the project purposes and – consequently – training materials for that purpose will be developed.

Because the VI software evaluation was favourable to *Cabri Geometry* and *LabVIEW*, these software will still be used also for the second edition of the Training Module sessions.