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Observation, not only perception but also cognition

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In the Swedish curriculum for the compulsory school:

Aim of biology:

Teaching in biology should aim at helping the pupils to develop knowledge of biological contexts, and their curiosity and interest in getting to know more about themselves and nature.



Knowledge requirements for grade E at the end of year 6

Pupils have **basic** knowledge of biological contexts and show this by **giving examples of and describing** these with **some** use of the concepts of biology.



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Partitioning student result into groups

25 students of Pre-service primary school teacher program

Course: Science and technology 20 weeks:

Chemistry, Physics, Biology and Technology



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Design learning situations so that the student will get conceptual understanding and the capacity to create learning situations for students in school.



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Develop skills to make observation and carry out systematic studies.



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First week in the course:

1. Create a relation with the place. Observe with all their senses.





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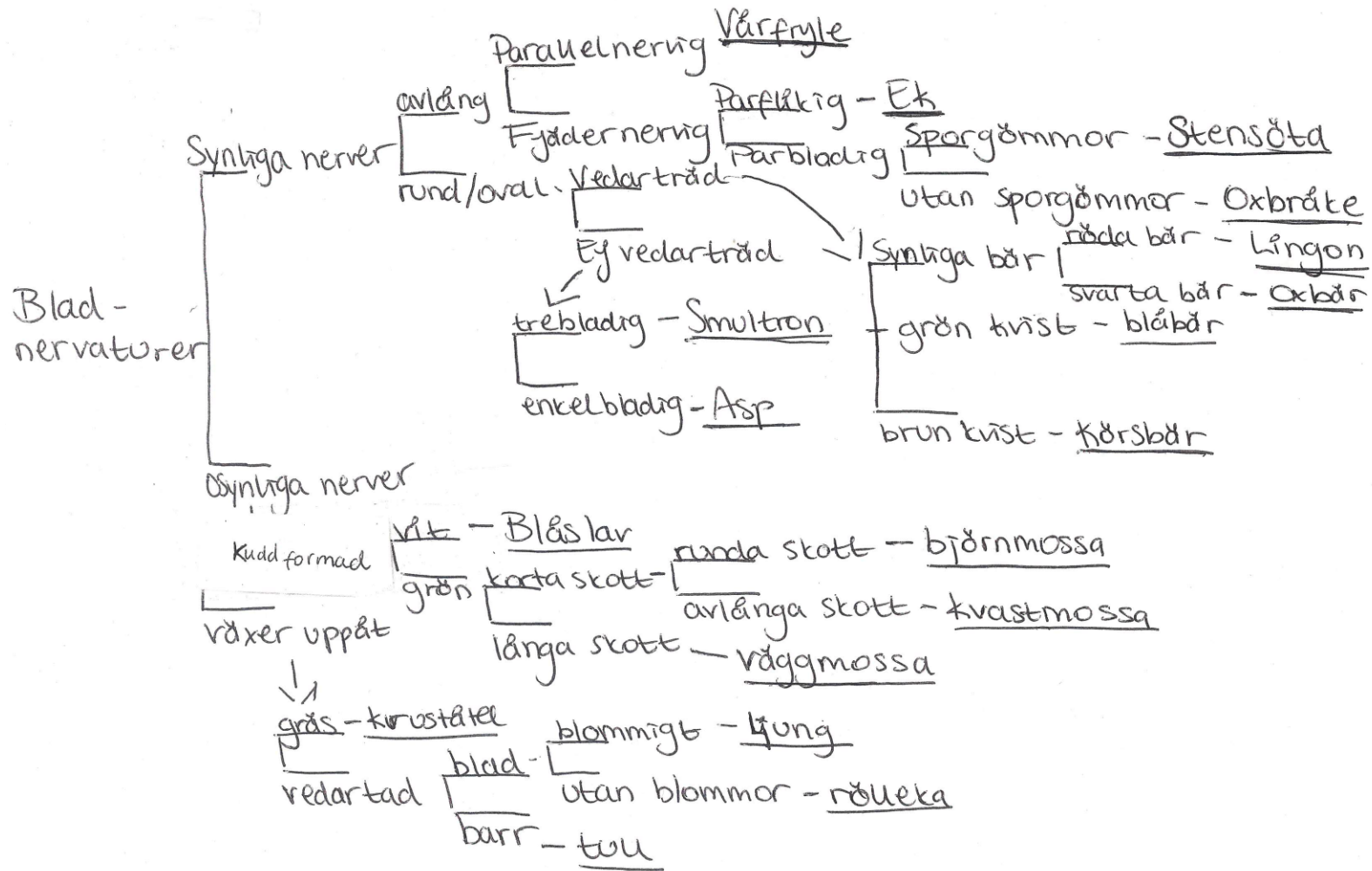
2. Make observations and described 2 different habitats in the field. Suggest what factors that had shaped the variation.





First week in the course:

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2. Make observations and described 2 different habitats in the field.
3. Suggest what factors that had shaped the variation.
4. **Make decision trees on collected and analyzed materials.**





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1. Create a relation with the place. Observe with all their senses.
2. Make observations and described 2 different habitats in the field.
3. Suggest what factors that had shaped the variation.
4. Make decision trees on collected and analyzed materials.
5. **Created a plan for an activity with children at school**



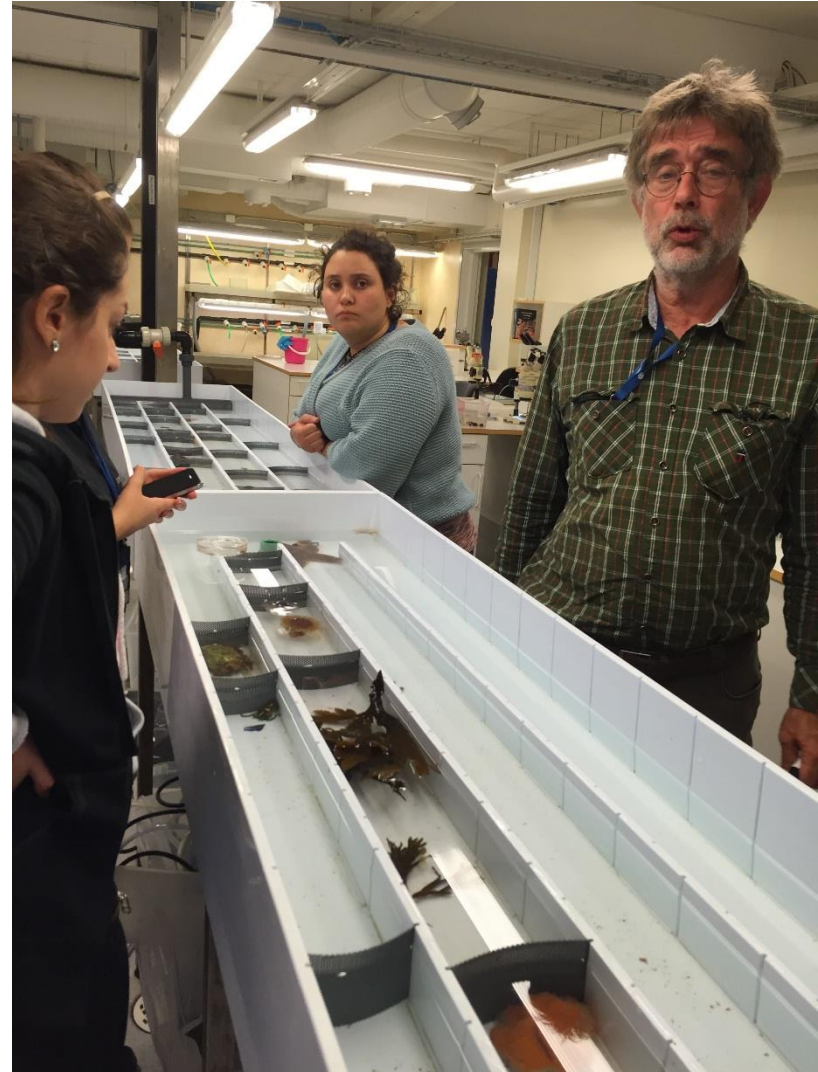
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The third week of the course we went to at trip with the student to a marine biology station at the West coast.



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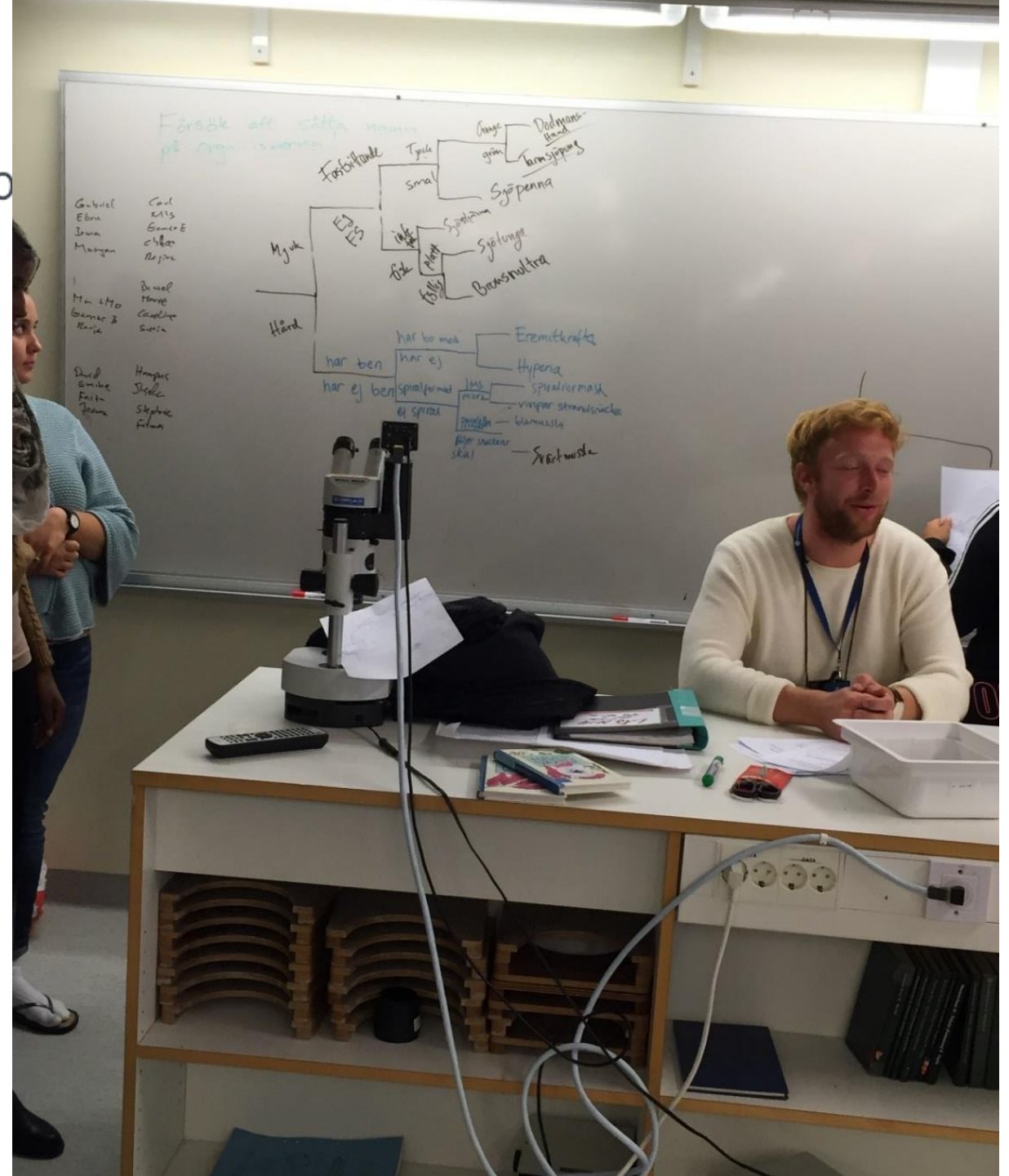
Collecting and sorting organisms from the North Sea





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Making decision trees on the sorted material.





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After six weeks the students wrote reflections of their experiences from observation activities and about their personal development.



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4R's of Doll

Doll's 4R's, *recursion, relations richness* and *rigor*, can be used to investigate the quality in reflections and other texts.



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Definition of 4R's of Doll

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Understanding at many levels, can give different interpretations, perspective and possibilities



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- **Rigor**

Consequently using knowledge in new ways and in new unexpected situations.

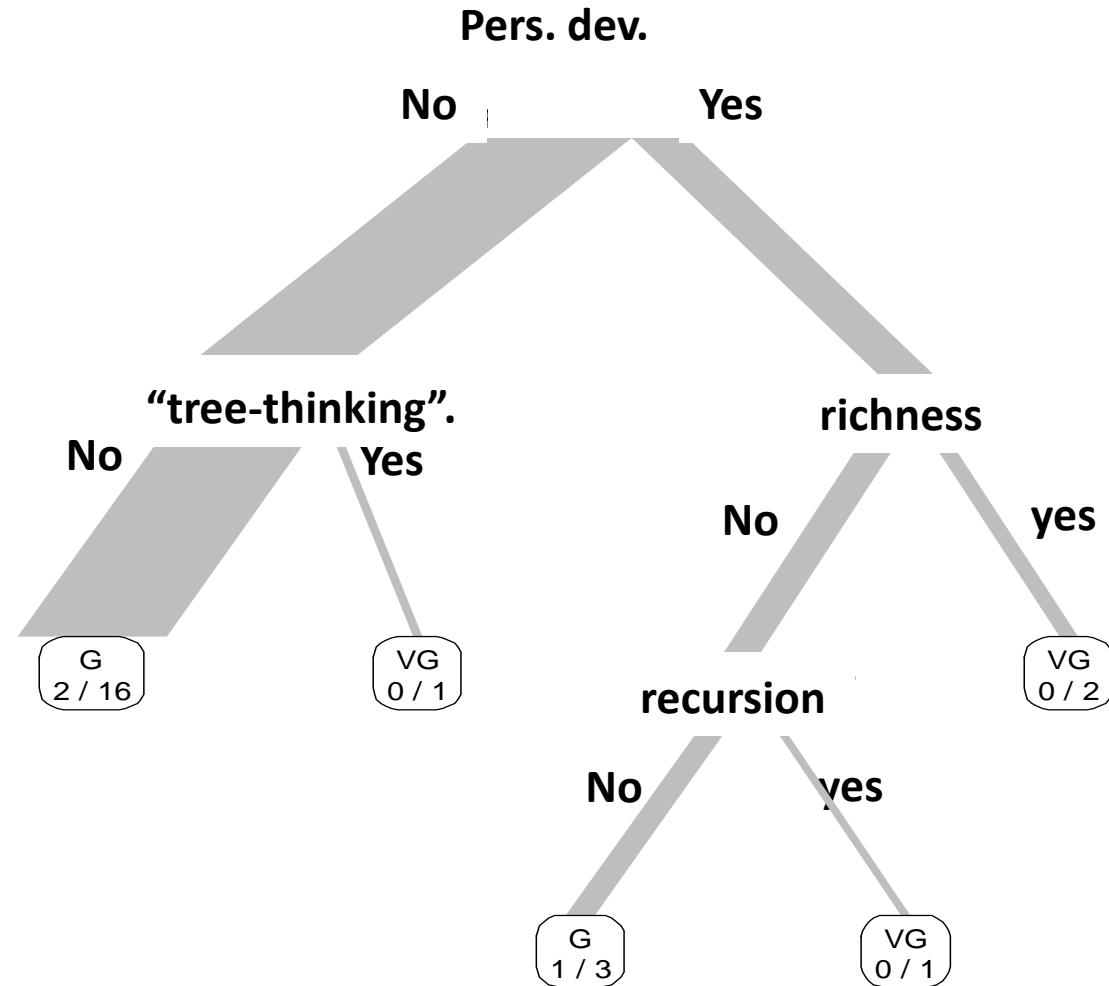


Type of R	Number of students (N=23)
Recursion	14
Relations	7
Richness	2
Rigor	2



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**Partitioning student results into groups using
a statistical method R-package.**





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Conclusions:

All of the students expressed their own learning by the variation of exercises.



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Most important factor for getting a higher grade is the awareness of personal development.



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Thank You!





Richness	Recursion	Relation	Rigor	personal dev	grade
1	1	1	1	1	VG
1	1	1	1	1	VG
	1			1	G
	1	1		1	G
	1	1		1	VG
				1	VG

