

Innovative pedagogies in Applied Plant Sciences and Erasmus exchanges

Analysis of a student's survey



Context of the survey:

Improving teaching method through innovative pedagogies is one of the goal of ESCAPAdE Erasmus+ project (Project 2008-1-FR01-KA203-048110, <https://escapade-erasmus.eu/>). All partners from our network have already some experience in such pedagogies and use them during their courses. Therefore, an initial survey on the perception of innovative pedagogies by our students, based on their own experience and ideas, represent useful data to take into account before developing new ones.

Methodology:

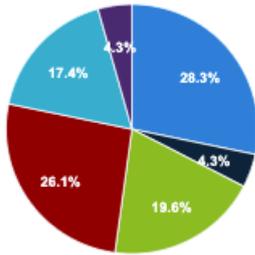
Two separate online surveys, prepared through framaform (<https://framaforms.org/>) were sent to students from the seven university partners of ESCAPAdE in 2019, with some questions not overlapping to each other's. They have been merged manually, but then for some missing questions the answer was arbitrary indicated as “no opinion” or “I don't know”.

Results:

In the result section, you will find the answers to the questionnaire (in % and numbers) and an analytic comment for each topic. For some questions, students were able to write their opinion and/or propositions. These are related here after.

University in which you are registered

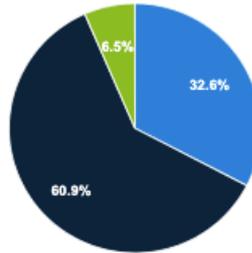
Chart options »



| | |
|------------------------------------------------------------|----|
| Montpellier SupAgro (MSA, France) | 13 |
| Ceska zemedelska univerzita v Praze (CULS, Czech Republic) | 2 |
| Universidad Politecnica de Madrid (UPM, Spain) | 9 |
| Universitaet fuer Bodenkultur Wien (BOKU, Austria) | 12 |
| Democritus University of Thrace (DUTH, Greece) | 8 |
| Other | 2 |

Your level of study

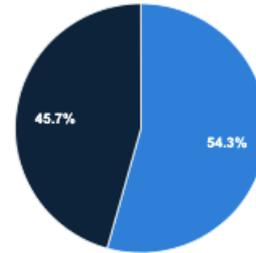
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| Bachelor | 15 |
| Master | 28 |
| PhD | 3 |

Your gender

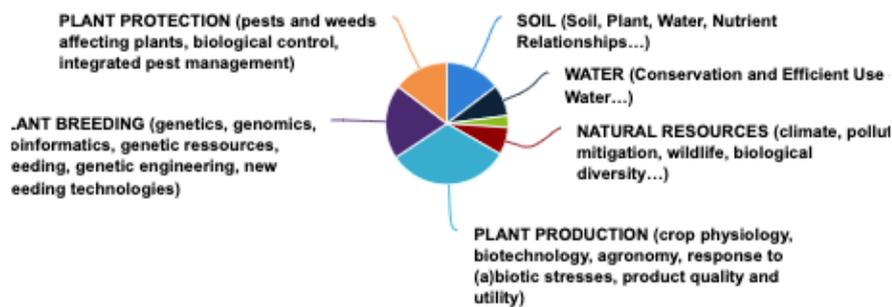
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| | |
|--------|----|
| Female | 25 |
| Male | 21 |

Comments: 47 answers were retrieved, only two answers were from Prague. Two answers were retrieved from a non-Escapade partner (technical University from Munich). Most of students answering the questionnaire at MSc level, with around same number of females and males.

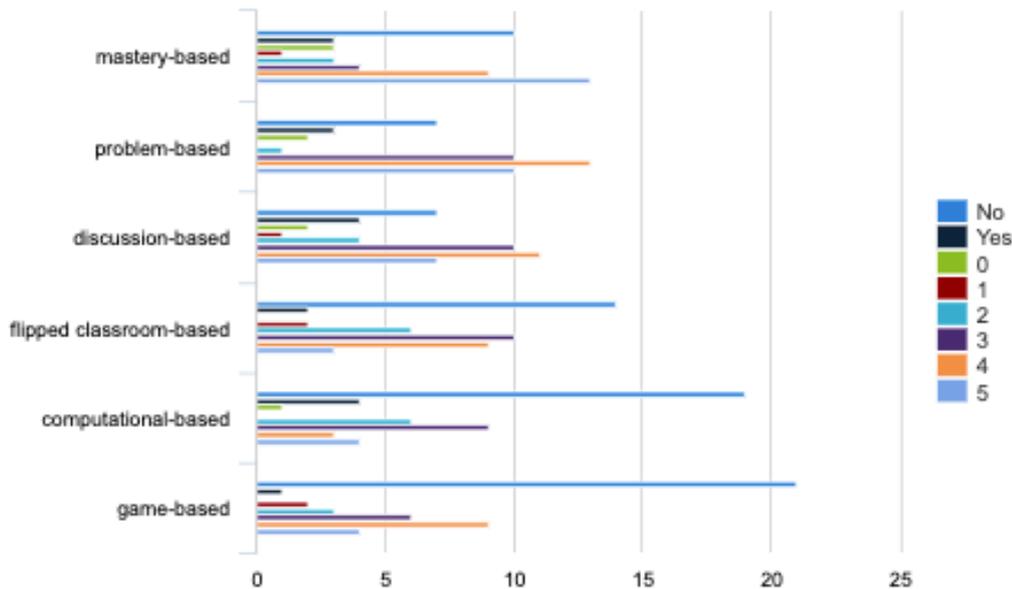
Your major knowledge area in Applied Plant Sciences



| | |
|----------------------------------------------------------------------------------------------------------------------------------|----|
| SOIL (Soil, Plant, Water, Nutrient Relationships...) | 14 |
| WATER (Conservation and Efficient Use of Water...) | 8 |
| FOREST AND RANGE RESOURCES (Agroforestry...) | 3 |
| NATURAL RESOURCES (climate, pollution mitigation, wildlife, biological diversity...) | 7 |
| PLANT PRODUCTION (crop physiology, biotechnology, agronomy, response to (a)biotic stresses, product quality and utility) | 31 |
| PLANT BREEDING (genetics, genomics, bioinformatics, genetic resources, breeding, genetic engineering, new breeding technologies) | 19 |
| PLANT PROTECTION (pests and weeds affecting plants, biological control, integrated pest management) | 14 |

Comments: The main disciplines in Plant Sciences in the universities involved are well represented, with three main fields: Plant breeding, plant production and plant protection.

You may have experienced some of those learning approaches during your curriculum. Please tell us which ones and your level of appreciation for those.



Comments: Game-based, computational-based and flipped-classroom based approaches were never experienced by some students.

The most appreciated pedagogical experiences were: mastery-based (22 with level 4 or 5), problem-based (23 with level 4 or 5), discussion-based (18 with level 4 or 5).

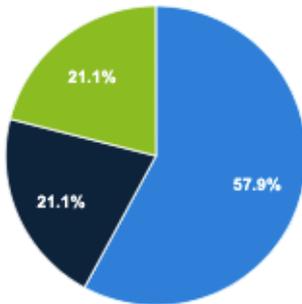
Best experiences (related in text format):

- ✓ "My best experience was a flipped classroom approach, that I found very helpful"
- ✓ "Some professors ask multiple choice questions during the lecture which students can and thereafter the answers are discussed, this requires that you pay good attention during the lecture and that you are already actively thinking about the matter. This helps a lot with staying active during the lecture and also to remember the content."
- ✓ "It is best applied if it is not only applied because it is an innovative method but when the teaching person feels passionate about the subject already and uses this method to better communicate certain issues to the audience. but the courses of those professors are usually great already, even without fancy new approaches. Because they love teaching and love their subject. If several professors and teaching persons at university are horrible in teaching, even fancy new approaches make it not better, rather even more ridiculous.
- ✓ "I do love lab classes. For me they make the theory understandable in the end."
- ✓ "virtual class, projects, games"

- ✓ *"The use of video during presentations and audio recording was a great tool to keep the materials in mind"*
- ✓ *"Project based: room for creativity and independent thought (with not much guidelines -> learning by doing => learning effect increased)"*
- ✓ *"Flipped classroom based: gives you the possibility to work at your own speed, understand basics on your own and discuss them on a higher (and more attentive) level than at a traditional lecture"*
- ✓ *"Mastery based: especially in science important, understanding is much greater if something is observed instead of just read/heard about"*
- ✓ *"For some matters, like very applied science it has been important for me to be able to perform Lab practices. That's for me what works better."*
- ✓ *"I really enjoyed interactive courses, where we need to respond to poll in direct, it was less boring than classic course and it helped to stay concentrate"*
- ✓ *"Speaking about a certain application of something by going step by step through an example"*
- ✓ *"The confrontation with real-life situations/ problems and trying to come up with a solution. E.g. As a group of students we had the task of conducting an experiment in hydroponics in greenhouse conditions. We were given full access to the facility and equipment. We made the experimental design by ourself (in cooperation with the professor) and also did the setup (in cooperation with the employees) and also took care of the cultivation."*
- ✓ *"With flipped Classroom I can learn at home with all the time I want, I don't have to wait for others to understand or I can spend more time exploring one precise notion. When I come to class, I can ask questions and spend time with the teacher on practical activities."*
- ✓ *"We had to view a plot and do a summary on different aspect of the plot. To me, field practice is more professionalizing. You can see the pros and cons some methods have which you would'nt have on a classroom"*
- ✓ *"The course started with theoretical lectures to learn the basics. Then we were assigned to a project. For this project we got a problem to solve. Therefore we had to use the knowledge gained from the lecture but we also had to do a literature research. After presenting our solution of the problem we had to perform the experiments in the lab. Finally we had to present our results and write a protocol."*
- ✓ *"Cross of tomato plants in a greenhouse"*
- ✓ *"The professor made a video recording the lectures and then you can listen to the entire lecture with the explanations for each slide again and again. Was very useful!"*
- ✓ *"The mastery based approach offers me the opportunity to learn by doing. I appreciate this approach because theoretical aspect is complemented by practice and therefore allows me to connect well theory with practice."*
- ✓ *"Plant pests and diseases in a lab class"*
- ✓ *"Once I spent an entire day reading articles about an environmental project (building a dam), in order to gather cases for a debate the next day. It was about a real dam which lead to a real debate that had taken place several years ago. Each group of students had to prepare arguments for their side of the debate (government, builders, environmental activists...). We learned a lot."*
- ✓ *"At Montpellier SupAgro, we do "role play" classes where everyone represents an actor and an idea to defend around a debate"*
- ✓ *"The information about crops plants and fertilisers."*

Do you remember the scientific subject learned with this new pedagogy?

Chart options »



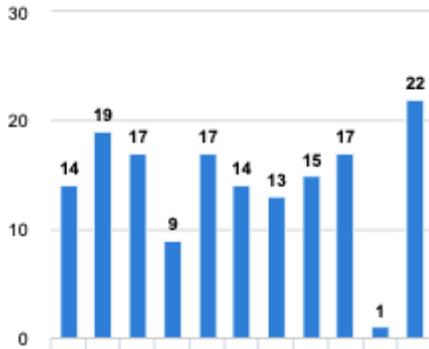
| | |
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| Yes | 22 |
| No | 8 |
| Not sure | 8 |

Comments: Only 60% of the students remember the subject learned (which is not that bad in term of learning outcome). A diversity of topics were answered:

- ✓ *"Insects"*
- ✓ *"Waldschadensdiagnostik"*
- ✓ *"Biochemistry, physics: electromagnetism"*
- ✓ *"Through guessing games several lecturers tried to involve us in topics on food waste and energy consumption."*
- ✓ *"Applied plant genetics and molecular biology"*
- ✓ *"Soil science"*
- ✓ *"Animal production"*
- ✓ *"Nutrition"*
- ✓ *"Geology"*
- ✓ *"Chemistry hydraulics"*
- ✓ *"Plant Breeding Principles and methods"*
- ✓ *"Plant secondary metabolism, plant abiotic stress, plant physiological disorders, biogeochemistry of soil (and terroir), sensory sciences, risk analysis (plant protection, mostly all Molecular related courses"*
- ✓ *"Genetic, plant production"*
- ✓ *"As a group of students we had the task of conducting an experiment in hydroponics in greenhouse conditions. We were given full access to the facility and equipment. We made the experimental design by ourself (in cooperation with the professor) and also did the setup (in cooperation with the employees) and also took care of the cultivation."*
- ✓ *"Economy"*
- ✓ *"Plant protection mainly"*
- ✓ *"It was about production of a worm protein in tobacco plants. The goal was to change the glycosylation pattern of the plant to mimic the worm glycosylation."*
- ✓ *"Plant breeding: create a variety of dwarf tomato with black fruits"*
- ✓ *"Plant Breeding and Molecular Plant Breeding"*
- ✓ *"Plant pests and diseases in a lab class"*
- ✓ *"It was on public policy and land use planning related to the construction of a dam"*

Based on your experience, what are the main advantages of innovative pedagogies?

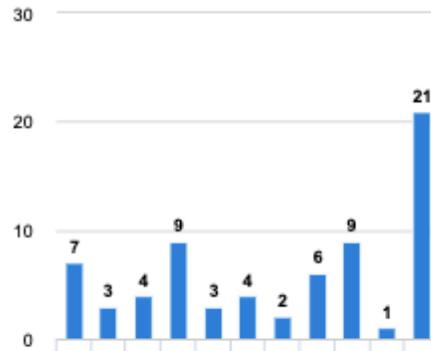
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| | |
|-----------------------------------------------|----|
| It improves scientific knowledge acquisition. | 14 |
| It improves student's engagement. | 19 |
| It improves student's self discovery. | 17 |
| It improves know-how and craftsmanship. | 9 |
| It improves imagination and creativity. | 17 |
| It improves higher-order thinking. | 14 |
| It improves inter-personal interactions. | 13 |
| It improves relevance to real life. | 15 |
| It improves transfer of understanding. | 17 |
| Other advantage | 1 |
| I don't know | 22 |

Based on your experience, are some of those drawbacks specifically associated with innovative pedagogies?

Chart options »



| | |
|--------------------------------------------------------------|----|
| It takes too much time. | 7 |
| It is slow and boring. | 3 |
| It is difficult to stay focused. | 4 |
| Some students are left behind. | 9 |
| The scientific content is very limited. | 3 |
| It does not emphasize sufficiently individual performance. | 4 |
| It promotes digital literacy instead of scientific literacy. | 2 |
| It is not sufficiently mastered by the teachers. | 6 |
| None of them | 9 |
| Other drawback | 1 |
| I don't know | 21 |

Comments: "I don't know" due to the non-overlap between the two surveys sent to students.

Many advantages were reported for innovative pedagogies, mainly:

- ✓ "It improves student's engagement"
- ✓ "It improves student's self-discovery"
- ✓ "It improves imagination and creativity"
- ✓ "It improves transfer of understanding"
- ✓ "It improves relevance to real life"

However, students are less convinced that “it improves know-how and craftsmanship”.

Some other advantages are also indicated:

- ✓ “It basically confronts you, your knowledge and a task so before following a protocol you must understand the aim and why you are doing it what you are doing.”
- ✓ Sometimes this knowledge can be very intuitive and some other times require a bigger background, but anyhow gives the student the opportunity to face him/herself to develop approaches or solutions, therefore the learning its more long lasting.”
- ✓ “It is fun”

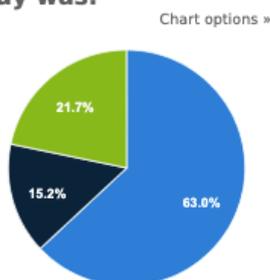
Few drawbacks were reported, mainly:

- ✓ “Some students are left behind”
- ✓ “It takes too much time”

Some other drawbacks are also indicated:

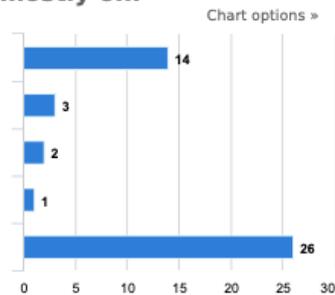
- ✓ “Mostly not well prepared”
- ✓ “The games are rather used to not let students fall asleep, but if the course is already that boring the game doesn't make it any better and actually makes the students feel even more wasting their time because no real content is transferred”
- ✓ “Often such is executed as teamwork. Then, of course, there are some team members who carry out major parts of the projects and others do less.”
- ✓ “Since it’s a very personal kind of learning you can not expect that all your students will come with the same approaches or solutions and that they will take the same time for it. Its the major drawback related to Lab experiences like thesis.”
- ✓ “Difficult to apply when there are many people involved”

Do you think that your learning success with innovative pedagogies during your university study was:



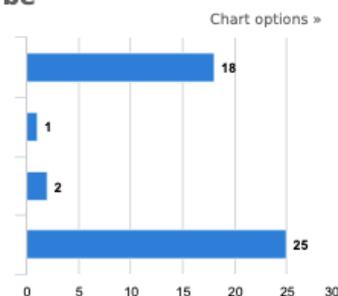
| | |
|---------------------------------------------|----|
| better than classical front desk teaching | 29 |
| the same than classical front desk teaching | 7 |
| I have no opinion on that | 10 |

The quality of the lectures with innovative pedagogies depended mostly on:



| | |
|---------------------|----|
| the teacher | 14 |
| the teaching method | 3 |
| the infrastructure | 2 |
| other factors | 1 |
| I don't know | 26 |

Based on your experience, would you prefer the proportion of innovative pedagogies to be

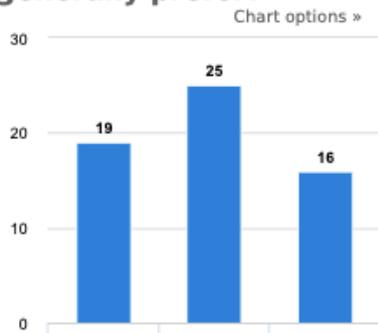


| | |
|------------------------|----|
| increased | 18 |
| decreased | 1 |
| kept at the same level | 2 |
| No opinion | 25 |

Comments: “I don’t know”, or “no opinion” due to the non-overlap between the two surveys sent to students.

Students who experienced innovative pedagogies believe that their learning success was higher. They would prefer the proportion of innovative pedagogies to be increased. However, the quality of those pedagogies mostly depends on teachers who are providing them.

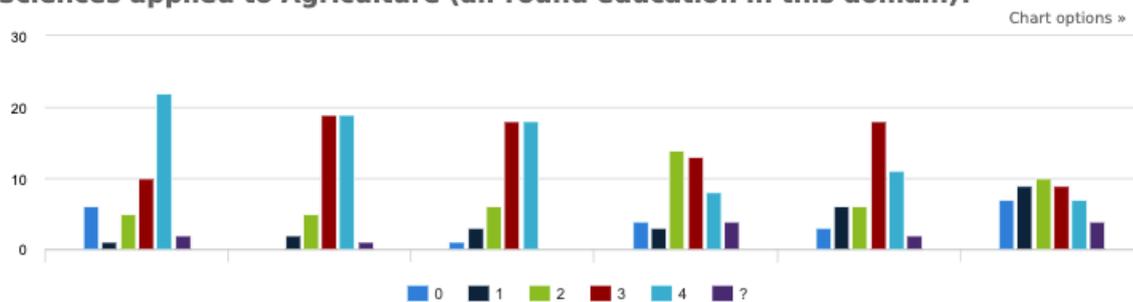
Which learning organization do you generally prefer?



| | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| cooperative learning (students working as a team to maximize their own and each other's learning with some level of interdependency) | 19 |
| collaborative learning (students progressing individually towards a common goal while being individually and collectively accountable for their work) | 25 |
| autonomous learning (individual take responsibility for their learning) | 16 |

Comments: There is no clear tendency: students appreciate the three types of learning organizations, which should be maintained.

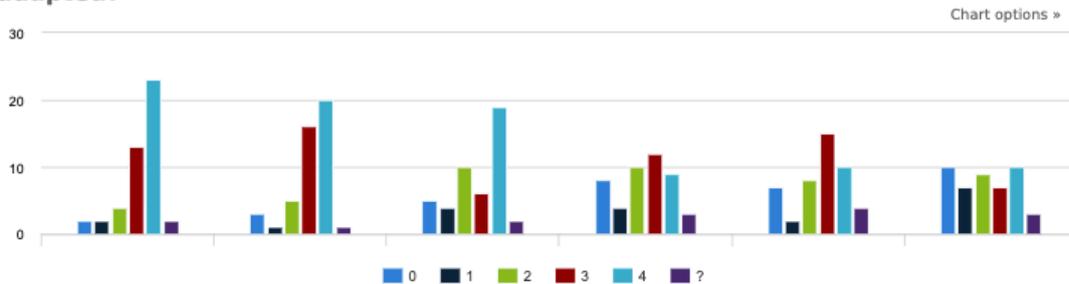
In your opinion, which ones are adapted to improve general knowledge in Plant Sciences applied to Agriculture (all-round education in this domain)?



| | 0 | 1 | 2 | 3 | 4 | ? |
|------------------------|---|---|----|----|----|---|
| mastery-based | 6 | 1 | 5 | 10 | 22 | 2 |
| problem-based | 0 | 2 | 5 | 19 | 19 | 1 |
| discussion-based | 1 | 3 | 6 | 18 | 18 | 0 |
| flipped learning-based | 4 | 3 | 14 | 13 | 8 | 4 |
| computational-based | 3 | 6 | 6 | 18 | 11 | 2 |
| game-based | 7 | 9 | 10 | 9 | 7 | 4 |

Comments: Mastery-based, discussion-based and problem-based approaches are considered to be well adapted to improve general knowledge in Plant sciences for Agriculture (but some students consider that mastery-based approaches are useless for this). Computational based approaches are relatively well considered too, but flipped learning and game-based approaches are diversely appreciated with this objective.

When studying a very specific method in Plant Sciences, which ones are adapted?

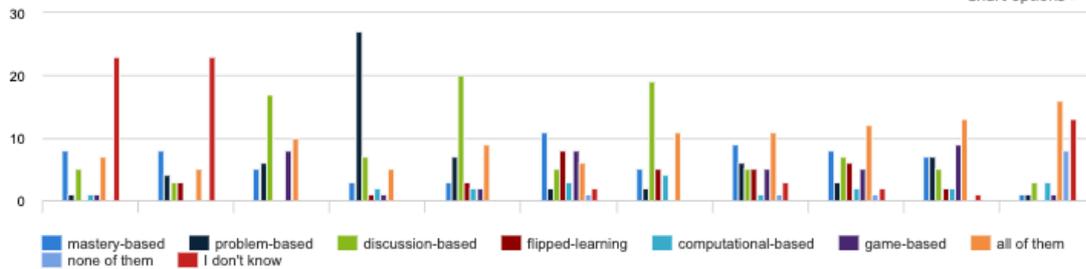


| | 0 | 1 | 2 | 3 | 4 | ? |
|------------------------|----|---|----|----|----|---|
| mastery-based | 2 | 2 | 4 | 13 | 23 | 2 |
| problem-based | 3 | 1 | 5 | 16 | 20 | 1 |
| discussion-based | 5 | 4 | 10 | 6 | 19 | 2 |
| flipped learning-based | 8 | 4 | 10 | 12 | 9 | 3 |
| computational-based | 7 | 2 | 8 | 15 | 10 | 4 |
| game-based | 10 | 7 | 9 | 7 | 10 | 3 |

Comments: We observed the same tendency as in the previous answer. Mastery-based and problem-based approaches are considered to be well adapted when studying a very specific subject. This is less clear for discussion-based approaches.

In your opinion, which pedagogy is more relevant to the following professional skills?

Chart options »

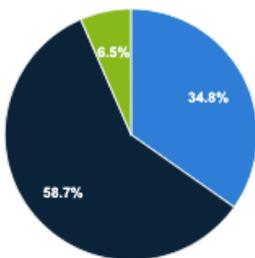


| | mastery-based | problem-based | discussion-based | flipped-learning | computational-based | game-based | all of them | none of them | I don't know |
|-----------------------------|---------------|---------------|------------------|------------------|---------------------|------------|-------------|--------------|--------------|
| Scientific knowledge | 8 | 1 | 5 | 0 | 1 | 1 | 7 | 0 | 23 |
| know-how and craftsmanship | 8 | 4 | 3 | 3 | 0 | 0 | 5 | 0 | 23 |
| Teamwork | 5 | 6 | 17 | 0 | 0 | 8 | 10 | 0 | 0 |
| Problem solving | 3 | 27 | 7 | 1 | 2 | 1 | 5 | 0 | 0 |
| Decision Making | 3 | 7 | 20 | 3 | 2 | 2 | 9 | 0 | 0 |
| Time Management | 11 | 2 | 5 | 8 | 3 | 8 | 6 | 1 | 2 |
| Communication and reporting | 5 | 2 | 19 | 5 | 4 | 0 | 11 | 0 | 0 |
| Focus and persistence | 9 | 6 | 5 | 5 | 1 | 5 | 11 | 1 | 3 |
| Flexibility/Adaptability | 8 | 3 | 7 | 6 | 2 | 5 | 12 | 1 | 2 |
| Creativity | 7 | 7 | 5 | 2 | 2 | 9 | 13 | 0 | 1 |
| Other | 1 | 1 | 3 | 0 | 3 | 1 | 16 | 8 | 13 |

Comments. All approached are appreciated related to professional skills. Mastery-based approaches well suited to improve time management, focus and persistence, scientific knowledge, know-how and craftsmanship, flexibility... Problem-based approaches almost were considered exclusively suitable to enhance problem-solving skills. Communication and reporting, and decision making can be enhanced through discussion-based approaches. Game-based approaches could enhance creativity and teamwork. This is less clear for the other methods.

In your opinion, does an innovative pedagogy necessary implies ICT?

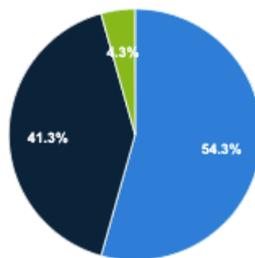
Chart options »



| | |
|--------------|----|
| Yes | 16 |
| No | 27 |
| I don't know | 3 |

Did you experience some ICT-enhanced pedagogy during your curriculum?

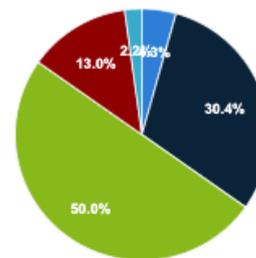
Chart options »



| | |
|------------------|----|
| Yes | 25 |
| No | 19 |
| I don't remember | 2 |

What is your level of appreciation for such pedagogies?

Chart options »

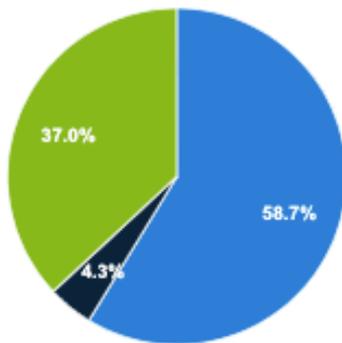


| | |
|--------------|----|
| rather bad | 2 |
| average | 14 |
| rather good | 23 |
| excellent | 6 |
| I don't know | 1 |

Comments. A majority of students does not agree with the necessity to involve information and Communication Technologies when performing innovative technologies, and their appreciation level of ICT is not very high.

In your opinion, does an Erasmus mobility give the opportunity to test new pedagogical practices?

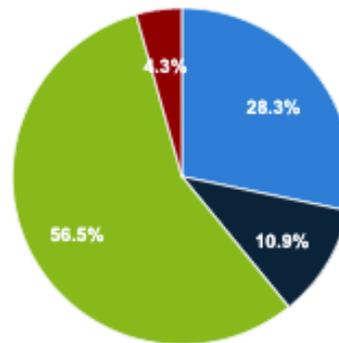
Chart options »



| | |
|--------------|----|
| Yes | 27 |
| No | 2 |
| I don't know | 17 |

Did you already experience new ways of learning during an academic mobility (Erasmus for example)?

Chart options »

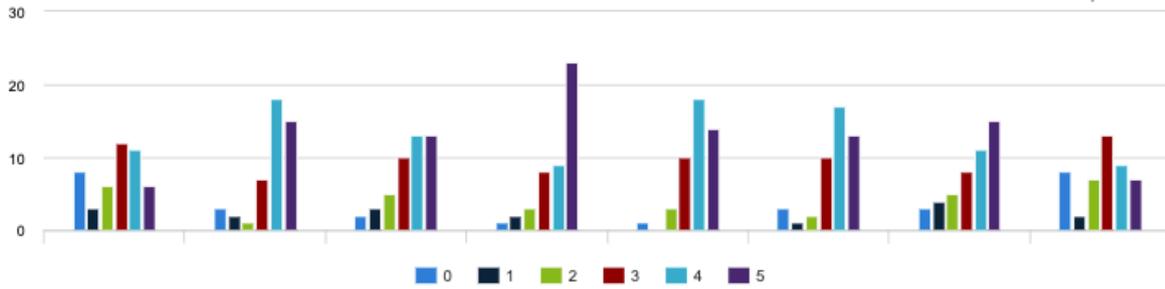


| | |
|-----------------------------------------------------------------------------|----|
| Yes, my academic mobility provided me new ways of learning. | 13 |
| No, my academic mobility did not provide specifically new ways of learning. | 5 |
| No, because I didn't experience any academic mobility yet | 26 |
| I don't remember | 2 |

Comments. A majority of students consider that Erasmus mobility gives the opportunity to test new pedagogical practices, but few of them have experienced it yet.

When choosing your host university for an academic mobility, please rank the importance of pedagogies offered in comparison to other criteria

Chart options »

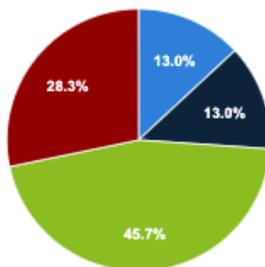


| | 0 | 1 | 2 | 3 | 4 | 5 |
|--------------------------------------------|---|---|---|----|----|----|
| diversity of pedagogies offered | 8 | 3 | 6 | 12 | 11 | 6 |
| country (geography / cultural environment) | 3 | 2 | 1 | 7 | 18 | 15 |
| reputation of the host university | 2 | 3 | 5 | 10 | 13 | 13 |
| course program of the host university | 1 | 2 | 3 | 8 | 9 | 23 |
| potential learning outcomes | 1 | 0 | 3 | 10 | 18 | 14 |
| language improvement | 3 | 1 | 2 | 10 | 17 | 13 |
| professional environment | 3 | 4 | 5 | 8 | 11 | 15 |
| amount of scholarship | 8 | 2 | 7 | 13 | 9 | 7 |

Comments. *The course program of the host university is the most important factor. The country and language improvement are important factors too, as well as potential learning outcomes and professional environment. The diversity of pedagogies offered, and the amount of scholarship, are diversely appreciated.*

Can you find easily information on pedagogical practices when trying to identify courses for your Erasmus programme?

Chart options »

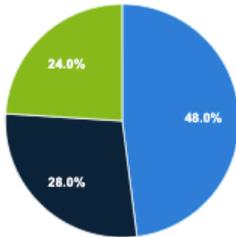


| | |
|-----------------------------------------------------|----|
| Yes | 6 |
| No, but I don't care | 6 |
| No, and I would appreciate to find this information | 21 |
| I don't know | 13 |

Comments. *"I don't know" due to the non-overlap between the two surveys sent to students. Students would appreciate to find more easily information on pedagogical practices when trying to identify courses for an Erasmus program.*

Do you find it easy to choose your preferred host university?

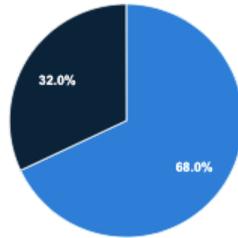
Chart options »



| | |
|--------------|----|
| yes | 12 |
| no | 7 |
| I don't know | 6 |

Would you find an "easy-to-use" database listing courses across several host universities in one search window...

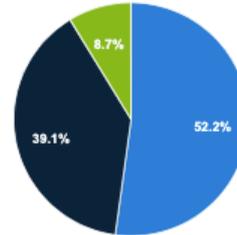
Chart options »



| | |
|-------------|----|
| very useful | 17 |
| useful | 8 |

Would you find the indication of teaching pedagogies associated with such courses...

Chart options »

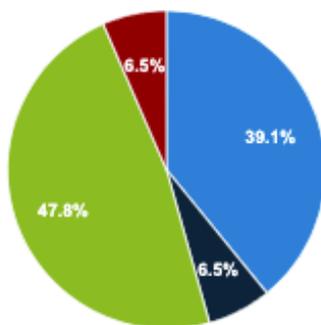


| | |
|-------------|----|
| very useful | 12 |
| useful | 9 |
| not needed | 2 |

Comments. The number of answers is lower because it was specific for another survey. Only half of the students find it easy to identify their host university. They would appreciate to use a database listing courses and their associated pedagogies.

Would you be interested in attending an European summer school (5 days) developing state-of-the-art concepts in Applied Plant sciences in an innovative way?

Chart options »

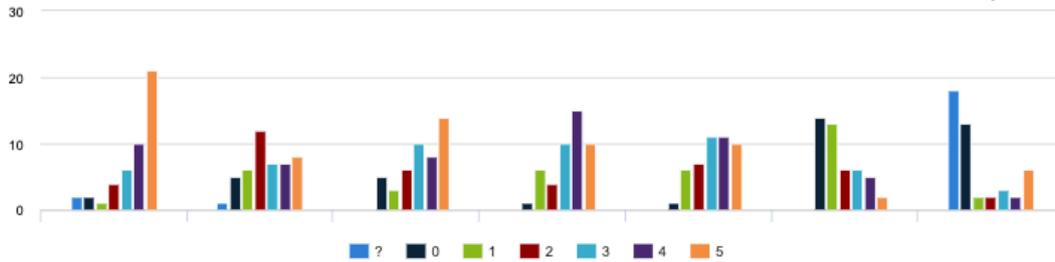


| | |
|--------------|----|
| Yes | 18 |
| No | 3 |
| Maybe | 22 |
| I don't know | 3 |

Comments. There is a potential interest from students answering to this survey and to attend a summer school.

What would be your main criterion for applying to such summer school?

Chart options »



| | ? | 0 | 1 | 2 | 3 | 4 | 5 |
|----------------------------------------------------------------------------------|----|----|----|----|----|----|----|
| Opportunity to improve my knowledge in this field | 2 | 2 | 1 | 4 | 6 | 10 | 21 |
| Novelty of pedagogic tools used by the pedagogic group | 1 | 5 | 6 | 12 | 7 | 7 | 8 |
| English as a learning language | 0 | 5 | 3 | 6 | 10 | 8 | 14 |
| Opportunity to interact with other students from different countries and origins | 0 | 1 | 6 | 4 | 10 | 15 | 10 |
| Opportunity to go abroad | 0 | 1 | 6 | 7 | 11 | 11 | 10 |
| Getting ECTS credits | 0 | 14 | 13 | 6 | 6 | 5 | 2 |
| Other | 18 | 13 | 2 | 2 | 3 | 2 | 6 |

Comments. Students would expect to improve their knowledge in Applied Plant Sciences. English as learning language will be important too. The third criterion seems to be the opportunity to interact with other students from different countries and origin (and going abroad). The novelty of pedagogic tools is less important, and getting ECTS credits is not important for them.

Other expectation indicated:

- ✓ “Providing and sharing experiences to build a better environment for future learning which is more practical and could be long lasting to students”
- ✓ “Its price, its location, if I'll have an appartement or if I need to find one...”

Other comments found at the end of the survey:

- ✓ “Innovative education leads to innovative people and communities!”
- ✓ “The teacher is what makes the difference, a lot more than the method. A good teacher would make you to be curious.”
- ✓ “Learning and getting more ECTS is useful for students, but personally I recommend less lectures and more practical related work”
- ✓ “Thank you very much for asking my opinion (:”