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Speaker 1: But within me. Could you briefly introduce yourself?

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Speaker 2: Yes, it is. Know some research. And the teacher, CRI a teacher and i teach undergrad Multi and the master student. What they do most these engineering. But the title of the module I give is never just engineering, it's the engineering for scientists, fablab for scientists and engineering the undergrad students. And I always try to, uh, frame engineering modules into, uh, problem solving, not into 0o... and their researches on the open, the open, the devices. Very great. Interesting.

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Speaker 1: So as you're in the right context, uh, the study that I'm doing, I just would like to understand if you expect certain thinking skills, higher order thinking skills from your students. And before answering the question, what is your idea about higher order thinking skills? What comes to my mind?

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Speaker 2: Uh, are you all down? To be a parent was, I mean, is it to be able to not doing something to focus and not doing something to broaden and doing nothing yet? For me, the most difficult part, even for researcher, is to find the your place in a new problem and also understanding you cannot solve everything by yourself, but still you can do a little bit of something. And how you what will be the best way to contribute and to go back for him? For me, it's the most difficult thing thinking skills I think student needs.

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Speaker 1: So if I understand correctly the ability to see the overall picture and also the ability to work very precisely on a particular task and contribution while contributing to the overall goal, right? This is what you perceive.

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Speaker 2: And also being aware of how little your part can be in a global problem, but still you still need to do it.

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Speaker 1: The understanding of what is the role of my contribution to the individual's contribution to it. So in order to understand that what kind of things are necessary, for example, I would like to now place or understand my significant contribution in the overall picture.

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Speaker 2: And for me, what is important is to see all models or model projects, some people inspiring, or inspiring projects, uh, where to start from a global idea that can burn that can change the world. And still, you see how they implement it and how they manage to make it locally and to something that works that is reproducible and Scalable. And so it's a good example for students to follow. Yeah. And so you can show them how big problem and small scale and big scale can relateget ?

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Speaker 1: So is this have you also try to with your students? All right. OK. So for example,

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what kind of behaviors or attitudes would let you know that the students developed the thinking you are expecting out of them? When would you be sure about it?

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Speaker 2: And maybe when they present their project, if they are better to, uh, for example, to pivot from only technical subjects into, uh, something else, more adapted to problem solving, for me it would be a proof of something. Is there something happened? And acquired this skills, for example, we can, uh, uh, we have this example of, uh, student who wanted to make a hydroponics. Um, at the beginning, he just wanted to build hydroponics farm like a small scale, and it was useless to just to redo what other people did uh, and by themselves, they say, Oh, it useless to redo this instead of this, we will do a program for schools on how to build hydroponic garden and how they can incorporate this into the curriculum. For me, it was the perfect because they are the first wanted to do technical stuff. And then they understood it was just that. And so they shifted to the to a better solution.

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Speaker 1: Mm hmm. So it is true that a kind of presentation that you are, you also observe how they kind of evolved. Over a period of time, our duties, just the final product presentation that you see them and then you see the progress and then understand the development has been done.

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Speaker 2: I think it is how they evolve through time.

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Speaker 1: OK, so second, the major ability to see the problem and their own contribution, the role, etc., etc. Apart from that, do you have any other important relevant skills that you think are necessary?

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Speaker 2: Yes. To identify the right problem. But it is related to think globally. And also empathy, you need to think of it as a user and as a person with a problem. And also to be a learner, to be able to learn fast new skills.

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Speaker 1: Nice. Thank you. I mean, the second section is about interdisciplinary science. What does your definition of interdisciplinary research?

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Speaker 2: For me, disciplines are not important at all. I don't care at all about disciplines. So I don't have a good definition of it. Of course, for me, everything is interdisciplinary because when you, for example, me, I come from an engineering background and you see when you got this literacy, you know, uh, you know how to do electronics. When you know how to code, you know how to code the electronics into the software. You can code apps. You can code biology now with reason, bioengineering. So it's really not a problem of discipline.

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Kishore: And so the reason why I ask that is that there is obviously discipline in these studies and interdisciplinary studies, multi-disciplinary and trans-disciplinary studies. There seems to

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be some kind of differences amongst them. So you you happen to work in an interdisciplinary field. So from what you said, I can just reformulate it and correct me. For you Discipline doesn't exist. Yeah, it's just the world around you and I try to navigate it. If I understand correctly.

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Speaker 2: And um, and and I'm quite sure and disciplines that are not good for research because they format too much the mind of a student. And for example, when my young student, high school student perform better than the master student or the student in the problem solving workshop we do. I think It's a big problem when I high school student perform better than a master student. and I see this because the master's students are too much formatted and they say, Oh, I'm a philosopher. I cannot do a coding. And because of this, they don't see a part of the world and after they are limited in to in a very narrow view.

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Speaker 1: Indeed!, And specifically related to this context of, you know, disciplines are multidisciplinary things. What are the skills you think are important things specifically to function in this mindset, in this approach

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Speaker 2: to learn by yourself, to be able

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Speaker 2: to, uh, know where to start where to stop into learning? and not to go too deep into something. Yes. And that for me, the most important skill is to to not be afraid about failing and not to be sure about yourself, like, because I think part of what the university do is and give you confidence in yourself by giving you a diploma. But when you learn by yourself, you don't have this seal of approval and it can be difficult for some people. You can feel that they are not justified to do coding if they don't have a good degree.

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Speaker 1: OK, so the ultimate skill that you expect required is independent learning, autonomous learning.

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Speaker 2: Yes, yeah

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Speaker 1: And if you can say any most important aspects for being an independent learner, what would that be?

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Speaker 2: Digital literacy, I think

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Speaker 1: digital literacy in terms of thinking skills, in terms of our internal skills, for example, motivation and

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Speaker 2: Yeah, Yeah motivation definitely

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Speaker 1: and any other things that comes to your mind, being an independent learner, apart from the administration and everything. I just want to learn and solve problems in the world apart from the things that we discussed earlier. Is there any other thing that you think is important

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Speaker 2: to be super curious about everything you want to know more about anything

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Speaker 1: That's right. Then I think we are almost done with the interview. Is that any other? no Just final question. Got almost thank you, thank God. So do you see your students struggle to develop the kind of skills that you try to teach them? Why such difficulty exist and what do you do to help them?

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Speaker 2: I think the problems for me the modules are short time and these kind of skills takes time to develop. You cannot develop in a short amount of time and something over time, and you develop and you build on. I don't think you can do this like other skills

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Kishore: . OK, great.

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Speaker 2: And also in big. Uh, in the bigger classes, it's much more difficult to interview student to have individual feedback. When we do projects in groups, we don't know individually people.

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Speaker 1: So I mean, this is if regardless of the content that we talk about kind of a problem that exists in dedication system time and individualized attention because the numerous quantity that we have. But if anything comes to your mind, specifically to the context of what we discussed in terms of skills that you try to teach. So apart from these two major factors that is always there in education, is there any other thing that comes to your mind what makes it difficult for students.

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Speaker 2: what is difficult for me also is normal university rules like grading because at the end we need to put grades, and so it changes a little bit the way we do work. And we don't do the way we would like to do because we have to give grades at the end.

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Speaker 1: So it kind of the university restrictions rules. Limits your freedom in exploring this. OK. Great. I think that's it.

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Speaker 2: because in the end, I would like, for example, to give a qualitative feedback but at the end the university just wants a number and want to know if students pass or not. And for me, it's difficult to put grades on problem solving.

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Speaker 1: Why, So, for example, if a person reached a certain ability to solve a problem or

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not should be probably reflected by some sort of assessment whether it's qualitative feedback or not. An end of the day you come to a conclusion that he or she is able to now solve the problem. So then that could be then interpreted into a grade, non-grading element of Pass or non Pass. But do you still think that even pass or non pass is something that you can't?

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Speaker 2: Pass or not pass is OK, but like specific grades are difficult.

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Speaker 1: putting a number is kind of a difficult task.

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Speaker 2: Yeah, yeah. For me, I basically in my mind is like pass or not pass. Indeed. And I give high grades to students and I got from the university people I got bad feedback saying, Oh, you need to have the badmarks to show. It's difficult

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Speaker 1: to have all the high marks

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Speaker 2: because we cannot give the diploma to everybody. So we need to have to classify people. We need to have a way to have good marks and badmarks. I think it is kind of outdated.

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Speaker 1: Yeah, indeed, it is Indeed outdated. Definitely. That needs a refinement. So as an alternative, if anything comes to mind in terms of assessment of such thinking skills, you know, because I can't see what is happening in the head. Yeah, I can't really put a number to it. What kind of things would you such an assessment?

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Speaker 2: Yes, and for technical discipline, I think it's more easy because like coursera , we can have to automated grading and peer reading. And I would like to develop more peer gradings, but I have no time because to do the engineering of the peer grading. It takes time I dont have this time.

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Speaker 1: So peer grading something that you would probably like to use, but lack of time also limits you from doing that.

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Speaker 2: Yeah, we don't have the tools to do it and the people to help us with this. And also to develop a... I think to go further into this module and to be more scalable and everything, and we think it would be very useful to have peer grading, to be more like Igem, like with the Wiki and to get feedback from the others and to reward people who give feedback,

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Kishore: Yeah

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Speaker 2: This kind of stuff, because I think giving feedback is part of the learning not the teaching and we don't do it well enough.

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Speaker 1: Indeed. Oh, that definitely would be great. I think I covered almost all of my questions. Thank you very much for your participation, Kevin.