

1 ---THE DIANA PROMPT---

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3 [00:04:09.16] Interviewer: I want you to imagine, um, that there's a  
4 professional engineer named Diana. And, um, her new work assignment has her  
5 doing more stuff with circuits than she did in the past. So she's doing a lot of  
6 work with circuits now in her job. Um, she's taking the same course you are to  
7 review circuits, but she's not getting graded. Uh, so, what do you think would  
8 be an ideal version of the course for her?

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10 [00:04:40.22] Wanda: Well...What do you mean by "doing a lot more circuits?"  
11 Like...

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13 [00:04:47.05] Interviewer: OK, so--

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15 [00:04:48.06] Wanda: More difficult, or?

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17 [00:05:05.04] Interviewer: Um, sure. So, she's--she's finding in her job, um,  
18 that her workload involves more analysis of circuits, let's say, and um, and  
19 she's realizing that, that she doesn't quite know it as well as she thought she  
20 did. So she's taking this course, but she's not taking it for a grade. She's  
21 just taking it to understand better.

22

23 ---REAL VERSUS IDEAL--

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25 [00:05:16.05] Wanda: Well, I think, um, the course should talk more about, um,  
26 how the actual world works. Because, sometimes we talk about, like, ideal  
27 circuits and, um theoretical methods. Those are not related to the actual  
28 circuit [in/and?] those kind of things. So if the professor can talk a little  
29 bit more about the actual circuit and how those work, then it may be better for  
30 her.

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32 [00:05:55.04] Interviewer: Why is that difference important to you?

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34 [00:05:57.19] Wanda: Um, Because the ideal world is different.

35

36 [00:06:02.29] Interviewer: OK

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38 [00:06:13.14] Wanda: Um, and, sometimes we talk about, um, the physical aspects  
39 of the circuits. Um, but I feel like when you really work on circuits it's--it's  
40 not very important. I mean, it's better to know what happened physically, but if  
41 those are not ideal circuits, then it's different.

42

43 [00:06:45.29] Interviewer: Hmm...So do you think if you're analyzing a  
44 real-world circuit, it's still important to know about the physical aspects of  
45 the circuit?

46

47 [00:06:55.19] Wanda: Not very important

48

49 [00:06:57.29] Interviewer: OK. What is important?

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51 [00:07:01.03] Wanda: What is important?

52

53 [00:07:02.13] Interviewer: Mmmhmm. Especially if you're dealing with a real  
54 world circuit.

55

56 [00:07:06.05] Wanda: Know exactly how the--what's the difference between a real  
57 world circuit and an ideal world circuit, and, yeah how to deal with the real  
58 one

59

60 [00:07:30.01] Interviewer: What are some examples of differences you can think  
61 of between ideal world and real world circuits?

62

63 [00:07:53.19] Wanda: I'm not taking the lab part of this course. Usually the  
64 professor says "but in the real world, it doesn't work like this"

65  
66 [00:08:00.16] Interviewer: When you started the course, did you have a sense of  
67 differences between ideal world circuits and real world circuits?

68  
69 [00:08:09.27] Wanda: No, I know nothing about circuits.

70  
71 [00:08:12.26] Interviewer: OK.

72  
73 [00:08:17.20] Interviewer: So, for you as you've taken the course, has your  
74 sense of real-world and ideal world changed in any way since the beginning?

75  
76 [00:08:28.00] Wanda: Yeah. Yes, I now feel like many components in the circuits  
77 are not perfect. It's not like you can completely use the physical method to  
78 analyze those.

79  
80 ---THE TWO KINDS OF QUESTIONS: OR, DO EEs NEED TO KNOW THE "PHYSICAL METHOD?"---

81  
82 [00:15:33.13] Interviewer: A student whose opinion I hear earlier from your  
83 class had noticed that the homework and tests seemed to contain two sort of  
84 types of questions--two different kinds of questions. And I was wondering if  
85 it's been your experience that you've noticed something like that.

86  
87 [00:15:51.06] Wanda: Oh, you mean like a physical question. Like, a theore--more  
88 like a theoretical question?

89  
90 [00:15:57.02] Interviewer: Umm, I'm not sure. They didn't elaborate much, so I  
91 was trying to get a sense of what your sense was.

92  
93 [00:16:01.09] Wanda: Oh. I think, um, you mean two parts, right? Umm, I think

94 one of them is like, um, just problem solving. Like, you have a diagram and then  
95 you solve for the current or voltage. Um, and the other type is like a physical  
96 question. They will ask you what is physically happening in the circuit, and you  
97 have to explain them in words.

98

99 [00:16:31.01] Interviewer: OK.

100

101 [00:16:33.24] Wanda: Um, because, um, I am also double-majoring. My second major  
102 is physics, so I guess it's good to know more about like, what's physically  
103 happening in a circuit. Like for me, cause I'm--that's my major. But, if,  
104 um--for a student who's just doing an EE major, I don't think that's very  
105 necessary.

106

107 [00:17:03.09] Interviewer: OK. So, do you think if there were other students  
108 like you who were double-majoring in, say, physics and EE, that you would  
109 suggest the same thing to them?

110

111 [00:17:13.14] Wanda: Yeah. I mean those questions are kind of annoying. But it's  
112 good to know.

113

114 [00:17:24.26] Interviewer: What is it that makes them annoying?

115

116 [00:17:25.26] Wanda: It's hard to under--to understand or to answer. It's, umm.  
117 Yeah maybe we don't know enough about physical things. Because, in class we  
118 don't talk about those. We don't--in class we just do the problem-solving part.  
119 So, um, yeah. It's hard to answer. I know many people, um go to the professor's  
120 office hours just asking those physical questions.

121

122 [00:18:10.06] Interviewer: Have you talked directly with anybody who has a hard  
123 time also answering the physical kind of questions?

124

125 [00:18:16.27] Wanda: Umm, yeah, but we didn't talk much.

126

127 [00:18:22.01] Interviewer: Hmm, OK.

128

129 [00:18:23.17] Wanda: Uh, yeah. know they feel annoying too.

130

131 [00:18:29.09] Interviewer: OK.

132

133 [00:18:32.28] Interviewer: So, um, this is a--this is a sort of difficult  
134 question, but, um, with our imaginary person Diana, who's the professional  
135 engineer. Do you think she would probably find that those questions are tough  
136 also?

137

138 [00:18:47.00] Wanda: Yes, I guess.

139

140 [00:18:48.05] Interviewer: OK. Why do you say that?

141

142 [00:18:50.25] Wanda: Because those physical questions are not very related to  
143 the actual world; not related to her job. So...that's why I say it's not very  
144 necessary for student[s] who are only in EE major to learn those parts.

145

146 [00:19:22.28] Interviewer: Do you think one kind of question is more helpful to  
147 you than the other kind?

148

149 [00:19:28.20] Wanda: Umm, yeah I think the problem solving is more helpful and  
150 more important.

151

152 [00:19:41.06] Interviewer: Do you think Diana would agree?

153

154 [00:19:48.29] Wanda: Probably.

155

156 ---HOW DO YOU KNOW WHEN YOU REALLY UNDERSTAND AN EQUATION?---

157

158 [00:20:12.24] Interviewer: When you're thinking about a problem that you're  
159 doing, or you're thinking about sort of the course in general, how do you know  
160 when you really understand an equation?

161

162 [00:20:25.25] Wanda: What do you mean by really undersand?

163

164 [00:20:29.06] Interviewer: OK. So one of the things that, um...Hmm...Do you ever  
165 get a sense when you're working, um, especially with something that's  
166 new--something that's maybe just been introduced in class. Um, how do you know  
167 when you get it?

168

169 [00:20:58.08] Wanda: Because I usually review all the notes after class. So if I  
170 can think through the way how the professor talks about it, then I think it  
171 should be good. And maybe do a littlle bit, like one or two problems. If I can  
172 get those answers right, then I think I understand it.

173

174 [00:21:28.08] Interviewer: Have you ever been working on a problem, and thought  
175 uh-oh, wait a minute, I don't think I get this equation?

176

177 [00:21:48.27] Wanda: Um, Yes. Um, Very frequently. Um... Then I would go back to  
178 my notes try to figure that out. And, you know, more--um, think more about the  
179 equation. Think more deeply. Um. Think about the physical aspect.

180

181 [00:22:04.16] Interviewer: Do you actually think about the physical aspect of  
182 the equation?

183

184 [00:22:07.11] Wanda: I try to use the physical aspect to help me to learn and  
185 really understand an equation. Sometimes it doesn't work, though.

186

187 [00:22:25.11] Wanda: Um, Sometimes it will just make me feel more confusing, and  
188 I will end up to go to the professor's office hours. Sometimes it works.  
189 And...yeah.

190  
191 [00:22:49.00] Interviewer: In those moments, how do you know or how do you get a  
192 sense of "uh-oh. I'm not getting this." It sounds like it's happened several  
193 times for you. How do you know in the moment that that's what's happening?

194  
195 [00:23:02.15] Wanda: Umm...Like, like you can look at a circuit from many  
196 different ways. And if I look at a circuit from one way, and then I get a  
197 result--say I get the voltage across a capacitor. And then I use another way to  
198 look at the circuit and get a different result, then I "oh" and "maybe I did  
199 something wrong." And, yeah.

200  
201 [00:23:41.16] Interviewer: And so your first step, when you think "oh I may have  
202 done something wrong" if I got two different answers." What's your first step?

203  
204 [00:23:49.02] Wanda: Go back and think through both ways again. And If the  
205 result's still different, then I would try to think, um which way I know more.  
206 Which way I'm more comfortable doing that. Because that way might be correct.

207  
208 [00:24:12.12] Interviewer: How do you know when you're comfortable with a  
209 particular way?

210  
211 [00:24:17.09] Wanda: Well...it's the way I usually use, um, in solving a  
212 problem.

213  
214 [00:24:23.02] Interviewer: OK. So, you're saying if there were two different  
215 ways

216  
217 [00:24:25.24] Wanda: Yeah

218

219 [00:24:26.12] Interviewer: um, and you get different answers [uh-huh] you might  
220 feel more comfortable with the way you usually use

221

222 [00:24:32.20] Wanda: Yes. [OK]. But, I mean, the other way might be just  
223 introduced by the professor. And maybe that way is actually easier, but just I'm  
224 not used to it.

225

226 [00:24:48.08] Interviewer: So, suppose your professor did introduce a new way to  
227 solve a problem and you weren't used to it. Would that keep you from using it?

228

229 [00:25:04.09] Wanda: No, I would try to use it more.

230

231 [00:25:03.05] Interviewer: OK. How come?

232

233 [00:25:07.28] Wanda: I guess that's, um...more easy.

234

235 [00:25:14.19] Interviewer: So if it were, if it were easier?

236

237 [00:25:15.17] Wanda: [inaudible] If it's easier way, yeah, or a more efficient  
238 way of doing it. Otherwise, what's the point of introducing another way?

239

240 [00:25:28.05] Interviewer: How do you know when something's an easier way?

241

242 [00:25:32.02] Wanda: I dunno. Uh, It takes less time to solve the problem.

243

244 [00:25:37.00] Interviewer: OK. So if you can find the answer more quickly--

245

246 [00:25:43.05] Wanda: Uh-huh

247

248 [00:25:43.26] Interviewer: it's probably an easier way?



249

250 [00:25:45.00] Wanda: Yes.

251

252 [00:25:45.22] OK.

253

254 [00:25:50.19] Interviewer: Does it ever happen that there's a way of doing a  
255 problem, um, that ends up being a different way of thinking about it, in a  
256 physics-y way, that makes more sense to you?

257

258 [00:26:11.13] Wanda: Um, I don't know. [OK] I never thought about that before,  
259 so, I dunno.

260