1 **SELF-REGULATED LEARNING MICROANALYSIS FOR THE STUDY OF**

2 **THE PERFORMANCE OF CLINICAL EXAMINATIONS BY**

3 **PHYSIOTHERAPY STUDENTS**

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55 **Abstract**

56 **Background**

57 Students require feedback on their self-regulated learning (SRL) processes to improve

58 the performance of clinical examinations. The key SRL processes used by students can

59 be identified by SRL-micro-analysis but this method has not been previously applied to

60 physiotherapy students. The aim of this pilot study was to evaluate the potential

61 usefulness of SRL-microanalysis for the identification of key SRL processes used by

62 physiotherapy students during the performance of a clinical examination skill. The

63 objectives of the pilot study were: 1) to evaluate whether SRL-microanalysis could

64 identify differences in the use of key SRL processes between successful and

65 unsuccessful students; 2) to evaluate the reliability of SRL microanalysis ratings

66 produced by different assessors.

67 *Methods*

68 SRL-microanalysis was used with second year physiotherapy students of a Spanish

69 university (n= 26) as they performed a goniometric task. The task required students to

70 obtain a goniometric measurement of the shoulder joint of a peer. Two assessors

71 evaluated student performance and conducted the SRL- microanalysis with all students.

72 An analysis of inter-rater reliability was performed to evaluate the degree of agreement

73 between assessors.

74 *Results*

75 The SRL-microanalysis revealed differences in the use of key SRL processes between

76 successful (n= 15: 57.0%) and unsuccessful performers (n= 11: 43.0%): The differences

77 were particularly evident in strategic planning and self-monitoring skills. There was

78 good inter-rater reliability for scoring of strategic planning (k=0.792), self-monitoring

79 (k=0.946) and self-evaluation (k=0.846).

80 ***Conclusion***

81 The use of SRL microanalysis characterized the key SRL processes of physiotherapy

82 students performing a clinical skill with reliability between the assessors. This pilot

83 study supports the potential usefulness of SRL-microanalysis for the identification of

84 key SRL processes in physiotherapy education. Therefore, this study paves the way to

85 the development of a full study, with a larger number of students and more diverse

86 clinical tasks, to evaluate the SRL processes in successful and unsuccessful students.

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101 **Background**

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103 There is strong evidence across diverse contexts, from academic studies to music

104 education and athletic training, that self–regulated learning (SRL) has an important

105 contribution to both understanding and informing feedback for enhancing performance

106 (1–4). SRL is a meta-cognitive process that has been defined as 'self-generated

107 thoughts, feelings, and actions that are planned and cyclically adapted to the attainment

108 of personal goals' (2). Learners who self-regulate engage in goal-directed behaviours,

109 use specific strategies to attain goals, and modify their goal-directed behaviours or

110 strategies to optimise learning (2). One of the most widely applied models of SRL was

111 proposed by Zimmerman and is grounded in social cognitive theory (2,5). This model

112 consists of 3 cyclical and iterative phases: forethought, performance, and self-reflection

113 (6). In the forethought phase, which takes place before the start of the task, learners

114 anticipate the nature and complexity of the task, set goals, and make specific plans to

115 ensure appropriate performance (5). The impetus for a learner to invest the necessary

116 effort to engage in self-regulation is determined by self-motivation beliefs, such as self-

117 efficacy, goal orientation, and task interest or value (1). In the performance phase, self-

118 regulated learners focus on monitoring and adjusting their actions. The strategies used

119 include attention focusing, relaxation, positive self-talk, and mental rehearsal of the

120 steps of the task (7) . In the self-reflection phase, after the task is concluded, learners

121 self-evaluate their use of SRL processes to achieve the task and reflect on whether these

122 processes need to be modified for enhancing future performance (7).

123

124 The use of SRL processes by learners are not amenable to evaluation by direct

125 observation but there are assessments which capture the key SRL processes that

126 individual learners employ to perform a specific task (8). Such assessments provide

127 useful information to enhance feedback to the learner (9). SRL-microanalysis is

128 designed to specifically evaluate how learners self-regulate across the three phases of

129 the SRL cycle by using "think aloud protocols" during real-time observation of

130 performance (1,8,10). At predetermined moments in performance, that correspond to

131 the three phases of the SRL cycle, learners answer questions that are related to the

132 forethought, performance, and self-evaluation phases, and the answers are subsequently

133 analysed (11). SRL-microanalysis contrasts with approaches that rely solely on

134 questionnaires, which are not designed to capture the entire SRL cycle and are subject

135 to bias related to the beliefs of an individual in self-efficacy or attribution bias (12).

136

137 Cleary and Sandars have investigated the use of key SRL processes in medical students

138 performing the clinical skill of venepuncture. They found that students with higher

139 levels of strategic thinking before, during, and after the venepuncture, performed better

140 than those with low levels of strategic thinking (13). A narrative review of published

141 meta-analyses of feedback interventions in education and a systematic review of

142 effective remediation interventions in medical education have highlighted the

143 importance of enhancing performance feedback with feedback about the use of key SRL

144 processes by students (14,15).

145

146 Despite the well-established importance of SRL in diverse educational contexts,

147 including medical education, it is unknown whether poor performance of clinical skills

148 in physiotherapy students may also be associated with difficulties in SRL. Therefore,

149 before conducting a full study to address this gap, we developed a pilot study to

150 evaluate the potential usefulness of SRL-microanalysis in physiotherapy students. Pilot

151 studies provide essential information about whether the rationale for a study and

152 the proposed methods are inappropriate or overly complicated [*Thabane L, Ma J,*

153 *Chu R, Cheng J, Ismaila A, Rios LP, Robson R, Thabane M, Giangregorio L, Goldsmith*

154 *CH. A tutorial on pilot studies: the what, why and how. BMC medical research*

155 *methodology. 2010 Dec 1;10(1):1..*]   Our pilot had a focus on (a) whether our SRL-

156 microanalysis method, can identify differences in the use of planning, monitoring and

157 self-evaluation, between   successful and unsuccessful students performing a clinical

158 task and (b)   the reliability of the SRL-microanalysis scoring made by different

159 assessors of the students' use of key SRL processes as they performed a clinical task. .

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161

162 The aim of this pilot study was to evaluate the potential usefulness of SRL-

163 microanalysis for the identification of key SRL processes used by physiotherapy

164 students during the performance of a clinical examination skill. The objectives of the

165 pilot study were: 1) to evaluate whether SRL-microanalysis could identify differences in

166 the use of key SRL processes between successful and unsuccessful students; 2) to

167 evaluate the reliability of SRL microanalysis ratings produced by different assessors.

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170 **Methods**

171 *Participants and setting*

172 Participants were undergraduate second year physiotherapy students at the Faculty of

173 Health Sciences, University of Las Palmas, in Gran Canaria, Spain. Students were

174 recruited at the conclusion of a lecture by the first author (RM). The general nature of

175 the study was explained without passing on specific information about SRL. All

176   participants had successfully completed the   "*Valoración en Fisioterapia I*"

177   (Assessment in Physiotherapy 1)-UNESCO code 3211.11, within the previous three

178   months, in which they had performed joint goniometric measurements similar to the

179   clinical skill task used in this study.

180

181   *The goniometric task*

182   We chose goniometry for our study as it is a common clinical skill task. It is also well-

183   defined within international physiotherapy curricula, for example, in the Canadian

184   physiotherapy curriculum (17). It consists of assessing the range of a joint's motion by

185   measuring the angle of motion(18). In this study, students were instructed to obtain a

186   goniometric measurement of the shoulder joint of a peer. This task included several

187   actions: positioning of the peer into a correct posture, setting the goniometer in the

188   correct position, moving the joint correctly through its range of motion, and obtaining

189   the measurement of the range of the angle of shoulder flexion (18).

190

191   *The SRL-microanalysis protocol*

192   The SRL-microanalysis protocol followed guidelines that have been previously used in

193   medical education (7). Before the start of the interview, the interviewer described the

194   task to the participant. The participant was asked to judge their ability to perform the

195   task on a scale from 0-10, and answer the strategic planning question: "Do you have any

196   particular plans about how you will obtain the measurement?*"*. After answering the

197   question, the participant would perform the task. After positioning the goniometer, and

198   prior to making any joint movement, the participant answered the self-monitoring

199   question: "Do you think you have performed a flawless process so far or have you made

200   any mistakes? Tell me about them". Finally, upon task completion, two self-evaluation

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201 questions to identify self-calibration were posed Accurate self-calibration of

202 performance is essential to initiate any change in future performance (16) . The first

203 question was "How satisfied are you with your current performance?" on a scale from

204 0-10 (19). The second was an open question: "What criteria did you use to determine

205 your satisfaction?". Finally, students were asked to judge their performance on a scale

206 from 0-10 (19).

207 (Table 1 near here)

208

209 *Data collection*

210 Prior to the observations, two experienced physiotherapists (RM and DA) agreed on the

211 expected standard of performance for the task. Independently, they marked the

212 performance of each student as successful or unsuccessful. All answers were audio-

213 recorded and transcribed by the first author (RM). Each SRL-microanalysis session

214 lasted from between 3 to 6 minutes.

215

216 *Data analysis*

217 Verbal responses were recorded and subsequently coded into categories related to the

218 use of key SRL processes. The coding scheme for the identification of the key SRL

219 processes was developed in advance and followed previous guidelines for SRL-

220 microanalysis (for more information please see (7,10,11). The responses to the open

221 questions were coded independently (13) by two authors (RM and DA). The inter-rater

222 agreement was calculated using kappa coefficients. Differences in coding between

223 examiners across all SRL measures were resolved through discussion among the authors

224 (RM, DA and MJC).

225

226 Answers to open question were coded into the following categories:

227 ● Strategic Planning: 1) Positioning the patient (patient focus); 2) Technical

228 performance using the goniometer (technique focus); 3) Patient and technique

229 combined; 4) Without a plan; 5) Do not know

230 ● Self-monitoring: 1) not aware of any mistakes; 2) mentions procedure related

231 mistakes; 3) non-procedure related mistakes; 4) do not know.

232 ● Self-Evaluation: 1) learning originating from theoretical lectures; 2) learning

233 originating from practical sessions; 3) learning originating from both theoretical and

234 practical sessions; 4) Other; 5) Do not know.

235

236 To investigate the pre and post difference between students' self-evaluation of

237 performance (calibration), we calculated t paired sample. For the quantitative analysis,

238 we used SPSS 21.0.

239

240 **Results**

241

242 *Recruitment*

243 The study enrolled 26 students, 19 were female (73.7%) and 7 were male students

244 (26.9%). They represented 38.8% of the second-year physiotherapy class.

245

246 *Task performance*

247 There were 15 successful students (57%) and 11 (43%) unsuccessful students on the

248 goniometric task. There were proportionally fewer female students in the unsuccessful

249 group (n=7) 63.6% compared to the successful group (n=12) 80%.

250

251   *Key SRL processes*

252   *(a) Forethought phase*

253   In the forethought phase, most successful students [14:15 (93%)] had planned the task

254   ahead and only one student stated no planning for performance. The plans described by

255   the successful students fell into three categories: positioning the patient (patient focus)

256   and correct technical performance using the goniometer (technique focus) combined

257   (n=6, 40%), technique focus (n=3, 20%), or patient focus alone (n=5, 33.3%).

258   We present three illustrative statements on focusing on the technique made by

259   successful students:

260   **017***: "I think I have a plan ... I put the goniometer first. I would ask him to raise his arm*

261   *and measure it. "*

262   **020***: "First I place the stretcher at a comfortable height, I ask the patient to get into the*

263   *most comfortable position and explain what he has to do. He should be comfortable".*

264   **015***: "Yes, I have a plan. First, I place the patient in a supine position, to be*

265   *comfortable and I adjust the stretcher. Then, I put the axis of the goniometer on the*

266   *lateral side of the humerus, the fixed arm parallel to the midline of the humerus... The*

267   *fixed one remains there, and another moves parallel to the midline of the humerus. And*

268   *I ask him for the flexion movement. And I measure it."*

269   In the forethought phase, six (54.5%) unsuccessful students were unable to explain their

270   action plan or stated that they had no strategy for performing the task. These students

271   were categorised as "Without a plan". The plans of unsuccessful students could also be

272   categorized into technique (n=2, 18.9%), patient (n=1, 9.1%) or technique and patient

273   (n=2, 18.9%).

274

275   *(b) Performance phase*

276 The narratives of successful students were very detailed, revealing attention to the

277 details of their performance. Successful students mentioned they were under the

278 impression they had committed a mistake (n=9, 60%), which were either related to the

279 procedure (for example, incorrect/imperfect positioning of the goniometer (n=6, 40%)

280 or to their own posture or the position of the bed (non-procedural) (n=3, 20%). There

281 was a single successful student who did not acknowledge to have self-monitored their

282 performance. In contrast, none of the unsuccessful students could recognize their

283 mistakes. Answers were divided in two categories: those who explicitly mentioned they

284 had made no mistakes (n=5, 46%) or those who were unable to answer the question

285 (n=6, 54.5%). This finding suggests that these students had internalized the task to a

286 level of expertise and that their use of key SRL processes had become routinized. For

287 more SRL microanalysis procedure details see table 2 and 3.

288 (Table 2 and 3 near here)

289 We present two illustrative statements of self-monitoring and awareness of procedural

290 mistakes made by successful students;

291 *06: "I made mistakes; I think ... I have to put the goniometer in this way… I am not*

292 *considering the alignment of the goniometer..."*

293 *26: "I think I am making mistakes in my posture ... maybe my leg on the stretcher."*

294

295 *(c) Self- evaluation phase*

296 There was little difference in answers by successful or unsuccessful students to the

297 question on self-evaluation. Successful students (n=7, 47%) were mostly focused on the

298 importance of paying attention in lectures. An illustrative statement from a successful

299 student :

300 *026: "what I remember from lectures…I should put it in the right way and if it should*

301 *go in the arm or move or not..."*

302

303 The median scores of successful and unsuccessful students' self-evalaution judgments

304 of performance (calibration) were, respectively, 6 and 8. After the task, the judgment

305 scores were higher for successful students (median = 8) than unsuccessful students

306 (mean = 7). The differences between the judgment of performance scores pre and post

307 task were statistically significant (t=2.613, p=.015) with a medium effect size (r=0.45)

308 (20).

309 There were three unsuccessful students with a high judgment of performance scores

310 before starting the task who were unable to complete the task. After the task, two of

311 these students reduced their judgment. The other student maintained the same judgment

312 after an unsuccessful performance. Although the student who maintained a high

313 judgment of performance had a planned the performance, the student lacked awareness

314 of mistakes when self-monitoring their performance. These findings suggest that the

315 student was overconfident and poorly calibrated in their initial and final judgments in

316 relation to his performance on the task.

317 The satisfaction scores were higher in successful students (mean=8.07), than in

318 unsuccessful students (mean=6.27). This difference between successful and

319 unsuccessful students was significant (t=2.663, p=0.014).

320

321 *Inter-rater reliability*

322 The inter-rater kappa coefficients for strategic planning (0.792), self-monitoring (0.946)

323 and self-evaluation (0.846) were high. For internal consistency, an alpha-Cronbach

324 coefficient of 0.846 was obtained for self-judgment prior and post task, and satisfaction

325 post-task.

326

327 **Discussion**

328

329 This pilot study suggests that a full study with the same research design to evaluate the

330 use of SRL-microanalysis to evaluate the use of key SRL processes by physiotherapy

331 students as they perform a clinical skill, may uncover SRL difficulties of physiotherapy

332 students that would otherwise be unnoticed. As expected, we found differences between

333 unsuccessful and successful students in strategic approaches to goniometric

334 measurements, namely in strategic planning and self-monitoring.

335

336 The differences between successful and unsuccessful students in their use of strategic

337 planning and self-monitoring processes are in line with previous findings in medical

338 students (10,11,13). For example, in a venepuncture simulation context, Sandars and

339 Cleary found differences in strategic approaches of Year 2 medical students (13). The

340 two main differences between successful and unsuccessful students were similar to our

341 findings, with an overall difference in strategic planning and self-monitoring. The wider

342 literature also shows that individuals who focus on their planning make better

343 adjustments during the task, compared to those who do not plan the activity (16,21).

344

345 This study also relates to research in other domains like sports performance, in

346 professional development, in musician's performance and in medical education

347 (3,11,22,23).

348

349 Interestingly, before the performance of the task, self-efficacy of performance was

350 higher in unsuccessful students than successful. The literature suggests that this lack of

351 calibration between perceived success in performing a task and their actual performance

352 is greater in unsuccessful students than successful students (24). The Dunning-Kruger

353 effect, in which unsuccessful students judge their knowledge or performance as better

354 than successful students, also applies (25). One explanation may be that unsuccessful

355 students think that they have all the necessary knowledge and skills, leading to

356 premature closing of studying and practicing.

357

358 To our best knowledge, researchers have not yet applied SRL- microanalysis techniques

359 to understand students' use of key SRL processes during the performance of clinical

360 skills in the physiotherapy context. Although we found interesting differences between

361 the use of key SRL processes between unsuccessful and successful students, our

362 primary focus has been on methodological development reflecting the breadth of use of

363 key SRL processes during a clinical task. First, the data suggest that SRL-microanalysis

364 may be carried out independently by multiple assessors with high inter-rater reliability.

365 Second, the recruitment of students was successful, with about 40% of students

366 agreeing to participate, suggesting that scaling up the number of participants should be

367 possible. The use of SRL-microanalysis appeared to be easy to carry out, with all being

368 completed within 5 minutes. The answers were succinct, which in turn facilitated the

369 transcription and analysis of the data.

370

371 The incorporation of SRL-microanalysis into the diagnosis of student under-

372 performance of clinical skills could potentially enhance the effectiveness of remedial

373 programs, by informing and directing the feedback to aspects that students need to

374 address to enhance their performance (9,14). The assumption that students can develop

375 key SRL processes is aligned with the idea that SRL interventions are one form of

376   helping students develop as independent, lifelong learners (22).

377

378   *Weakness and Future research*

379   This study shares the weaknesses of any pilot study in terms of the generalizability of

380   findings. Our study was restricted to a small sample from one institution and, in terms

381   of clinical skills it was restricted to goniometry of one joint. However, the consistency

382   of our findings with previous research suggests that similar findings may also occur

383   with studies performed on other clinical skills in physiotherapy.

384

385   This pilot study was an attempt to understand whether the use of SRL-microanalysis

386   would add value to the identification the key SRL processes, particularly when students

387   were unsuccessful. Our findings support the potential of applying SRL-microanalysis

388   for the characterization of the use of key SRL processes by physiotherapy students

389   while performing a clinical skill. Important aspects of the potential usefulness of the

390   SRL -microanalysis identified by the study included (1) the identification of key SRL

391   processes with high inter-rater reliability; (2) the identification of differences in key

392   SRL processes between successful and unsuccessful students in strategic planning and

393   self-monitoring; (3) less than 5 minutes of student and observer time were sufficient to

394   obtain useful information on the use of key SRL processes. The rationale and methods

395   used in our pilot study can inform future research, and we recommend increasing the

396   sample size and expand to a range of different clinical skills to investigate whether our

397   findings may be generalized and also the potential of the findings to inform feedback.

398

399   **Conclusions**

400   Our findings suggest that SRL-microanalysis is a potentially useful approach to identify

15

401   students' use of key SRL processes during performance of clinical examination skills in

402   physiotherapy. As this was a pilot study, further research with the same research design

403   is recommended to ensure generalization as well as the reproducibility of our findings.

404

405   **Abbreviations**

406   SRL: Self-regulated learning. CBE: Competency-based education.. RM: Raquel

407   Medina. DA: David Álamo. MJC: Manuel João Costa. SPSS: Statistical Package for the

408   Social Sciences. SE: self-efficacy

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410

411   **Declarations**

412   1.*Ethics Approval and consent to participate*

413   The Ethical Committee of Human Research of the ULPGC granted ethical approval for

414   the study, reference CEIH-2018-01**.**

415   *2.Consent for publication*

416   All participants provided informed consent.

417   *3.Availability of data and material*

418   All data generated or analysed during this study are included in this published article

419   and its supplementary information are available from the corresponding author on

420   reasonable request.

421   *4.Competing interests*

422   The authors report no conflicts of interest. The authors alone are responsible for the

423   content and writing of the article.

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428   *6.Authors' contributions*

429   • Concept and idea for the research: M. J. Costa, R. Medina-Ramirez

430   • Design of the research: M. J. Costa, R. Medina-Ramirez, J.Sandars

431   • Data collection: R. Medina-Ramirez, D. Álamo-Arce

432   • Data analysis: M. J. Costa, R. Medina-Ramirez, D. Álamo-Arce, D. Cecilio-

433   Fernandes

434   • Project management: F. Rodriguez-Castro, M. J. Costa

435   • Providing facilities/equipment: D. Álamo-Arce

436   • Writing: M. J. Costa, R. Medina-Ramirez, D. Cecilio-Fernandes, J. Sandars,

437   F. Rodriguez-Castro

438   • Final approval of the version to be submitted: F. Rodriguez-Castro, M. J.

439   Costa, J.Sandars

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443   *8.Authors' information*

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445   student from University of Las Palmas of Gran Canaria.

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551 TABLE 1. SRL Microanalytic Assessment protocol.

SRL Phase	SRL Sub process	Measure/Questions	Timing of administration	Coding Scheme
Forethought	Self-efficacy Pre-Task	Scale 0-10	Pre-task	0-10
	Strategic Planning	Do you have any particular plans for how to take data about the joint grades?	Immediately preceding the first attempt to take the measure.	1) Patient focus 2) Technique focus 3) Patient care and technique focus 4) No plan

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				5) Do not know
Performance	Self-monitoring	Do you think you have performed a flawless process thus far or have you made any mistake? Tell me about them.	After the measure began but prior to obtaining goniometric grades.	1) Not aware of any mistake 2) Procedural mistake 3) Non-procedural mistake 4) Do not know
Self Evaluation	Satisfaction	How satisfied are your current performance? Scale 0-10	After the task was completed.	0-10
	Self-evaluation	What criteria did you use to determine your satisfaction?	After satisfaction question	1) Lectures 2) Practical lessons 3) Lectures and practical lessons 4) Other

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				factors
				5) Do not
				know
Self-efficacy Post-Task	Scale 0-10		After self-evaluation question.	0-10

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554 TABLE 2. Qualitative variables: Strategic planning, Self-monitoring and Self-
555 evaluation.

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	QUALITATIVE ANALYSIS	SUCCESSFUL (n)	UNSUCCESSFUL (n)	TOTAL
STRATEGIC PLANNING COODING	Patient care	5	1	6
	Technique	3	2	5
	Patient care and technique	6	2	8
	No plan	1	6	7
	Do not know	0	0	0
	TOTAL	15	11	26
MONITORING CODING	Not aware of any mistake	5	5	10
	Procedural mistake	6	0	6

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	Non-procedural mistake	3	0	3
	Do not know	1	6	7
	TOTAL	15	11	26
SELF-EVALUATION CODING	Lectures	7	2	9
	Practical lessons	2	0	2
	Lectures and practical lessons	1	3	4
	Other	2	3	5
	Do not know	3	3	6
	TOTAL	15	11	26

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579 TABLE 3. Examples quotes in each phase differentiated by successful and unsuccessful

580 students.

PHASE	CODING SCHEME	EXAMPLES SUCCESSFUL QUOTES	EXAMPLES UNSUCCESSFUL QUOTES
FORETHOUGHT PHASE: Do you have any particular plans for how to take data about the joint grades?	1) Patient interaction/care	*020. First I place the stretcher at a comfortable height, I ask the patient to get into the most comfortable position and explain what he has to do. He should be comfortable".*	*013. "I have to tell the patient what I am going to do, put him in a good position and perform the task."*
	2) Technique	*017."I think I have a plan ... I put the goniometer first. I*	*011. "Yes, I follow the bony regions and how is the movement*

		would ask him to raise his arm and measure it. "	*to apply the tool".*
	3) Patient care/ technique	*015."Yes, I have a plan. First, I place the patient in a supine position, to be comfortable and I adjust the stretcher. Then, I put the axis of the goniometer on the lateral side of the humerus, the fixed arm parallel to the midline of the humerus.. And I measure it"*	*003. "First, I prepared the patient, and then I allocate correctly the goniometer"*
	4) Any plan	*030. "I have no plan right now"*	*021."I am not thinking about a plan right now"*
	5) Do not know	*No examples*	*No examples*
PERFORMANCE PHASE: Do you think you have performed a flawless	1) Not aware of any mistake	*006: "I made mistakes, I think ... I have to put the goniometer in this*	*009. "No, it is correct"*

process thus far or have you made any mistake? Tell me about them.		*way… I am not considering the alignment of the goniometer..."*	
	2) Procedural mistake	*026: "I think I am making mistakes in my posture ... maybe my leg on the stretcher."*	*No examples*
	3) Non-procedural mistake	*030. "I thin it is correct"*	*No examples*
	4) Do not know	*012. "I am not sure…I do not know"*	**07:** *"I do not know if I have made any mistakes..."*
SELF-EVALUATION PHASE: What criteria did you use to determine your satisfaction?	1) Lectures	*026: "what I remember from lectures…I should put it in the right way and if it should go in the arm or move or not..."*	*009. "The knowledge learned in lectures"*
	2) Practical lessons	*030. "The concept learned in the practical lessons and*	*No examples*

		practical exams"	
	3) Lectures/ practical lessons	020. "In what I have learned in lectures and practical lessons during the year"	013. "Beacuse I have learnt how to do it in lectures and practical lessons"
	4) Other factors	016. "First of all, I were insecure with the goniometer and then I realised my mistakes.."	007. "I observed my performance and I realised my mistakes"
	5) Do not know	015. "I do not know exactly.."	021. "I do not know….I do not remember…"

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