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1   # Self-reported adaptability among postgraduate dental

2   # learners and their instructors: accelerated change induced

3   # by COVID-19

4   Short title: Self-reported adaptability of learners and instructors during COVID-19

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Abstract

It is forecasted that the skills and competencies necessary for post-pandemic success in

higher education need to be founded upon adaptability, coping, and Self-regulated Learning

(SRL). It is worth investigating how stakeholders perceived their adaptability and coping

with the accelerated change accompanying COVID-19. Accordingly, the purpose of this

study was to assess the self-reported adaptability of postgraduate dental learners and their

instructors in the context of abrupt transition to distance learning induced by the pandemic.

This study utilized a convergent mixed methods study design. The qualitative and

quantitative data were concurrently collected from instructors and learners. The datasets were

analyzed independently, and the generated information was integrated using a joint model

analysis.

The percentage of average of self-reported adaptability of both groups was 81.15%. The

instructors, with a mean of satisfaction of 17.94 (±1.76), rated their adaptability significantly

higher than the learners, with a mean of satisfaction of 15.66 (±2.77) (p=0.002). The thematic

analysis resulted in two interrelated themes: Self and Environment. Within the Self theme,

three subthemes surfaced: Cognitions, Emotions, Behaviors. As for the Environment theme,

it encapsulated two subthemes: Enablers and Impediments.

The stakeholders perceived themselves to have adapted well to the transition, and SRL

appeared as a cornerstone in the adaptation to the accelerated change (accompanying

COVID-19). There appeared to be an interplay between the cognitions, emotions, and

behaviors on the level of the self as part of the adaptation process. Also, building upon

existent models of SRL, this study uncovered that the stakeholders considered the

environment to play a crucial role in their adaptation process. This highlights the importance

48   of developing a climate that remains, despite external pressures, conducive to attaining

49   learning and teaching goals. It is also crucial for university-level mental health promotion

50   activities to proactively foster, among learners and instructors, adaptability, building

51   'academic resilience'.

52   **Keywords:**

53   Postgraduate; Dental Education; Distance Learning; COVID-19 Pandemic; Change

54   Management; Accelerated Change; Adaptability; Self-regulated Learning.

Introduction

The COVID-19 pandemic made characterizing today's world as Volatile, Uncertain, Complex and Ambiguous (VUCA) more relevant than ever before (1-3). This pandemic brought about an accelerated change where remote interaction became the only plausible solution at a point in time. The need to "go remote" at the onset of the pandemic accelerated innovation in telecommunication. It brought to the forefront the previously underused internet-based services and products, such as telehealth (4), e-commerce (5), and distance learning (6).

This accelerated change was evident in higher education (6), where learning and teaching all around the world had to switch to the online environment abruptly (7). The volatility of the environment got heightened due to the continuous changes that this sector is having to keep up with (8). This is associated with uncertainty. Although a lot of research and investigations are taking place to enable foresight (9), no one knows with any great certainty the current and long-term effect of the pandemic on learning and teaching. The situation has been novel and seemingly uncontrollable and remains unresolved (10). The introduced complexity has been evident on all socioecological levels of higher education, where stakeholders need to deal with diverse stressors (including but not limited to: safety concerns, sense of isolation and loneliness, and complete disruption of daily routines), along with mental health difficulties such as isolation and loneliness (10), and depression and anxiety (11). Since these times are unprecedented, there is a substantial amount of ambiguity that all the higher education stakeholders need to deal with (11); everyone appears to be resorting to trial-and-error techniques to adapt (12).

77   This situation revealed how inadequately prepared higher education was for radical

78   transformation (13-16). This is especially true in health professions education, where

79   educators got challenged with ensuring the protection of the health and wellbeing of all their

80   stakeholders, including the trainees, continuity of quality education, confidence in health and

81   safety measures, and abidance to guidelines for clinical training. Many teaching clinics and

82   academic hospitals ended up suspending all activities involving trainees. This significantly

83   affected students' quality of education, where their experiential learning and clinical exposure

84   got compromised considerably (17). If not made up for, this gap in clinical learning will

85   inevitably impact developing the competencies required for nurturing and graduating safe,

86   competent healthcare providers (18).

87   It is forecasted that the skills and competencies necessary for post-pandemic success in

88   education during the next five years need to be founded upon adopting skills related to

89   emotional intelligence, learning and innovation, and information, media, and technology (19-

90   21). Accordingly, from an educational psychology perspective, it is essential to highlight

91   Self-regulated Learning (SRL) and its constituents. Systemically leveraging the cognitive,

92   metacognitive, behavioral, motivational, and emotional/affective aspects of learning becomes

93   more important as the external environment becomes more challenging. This, in turn, will

94   raise their self-efficacy and sense of agency, cognitive resilience, and adaptability (22). In

95   fact, from this perspective, adaptability, coping, and SRL becomes intertwined. Adaptability

96   has been conceptualized and defined as "… the capacity to constructively regulate psycho-

97   behavioral functions in response to new, changing, and/or uncertain circumstances,

98   conditions, and situations…" (23).

99   It is worth investigating how well the relevant stakeholders perceived themselves to adapt

100   and cope with the accelerated change, and the corresponding VUCA, accompanying COVID-

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101   19. Accordingly, the purpose of this study was to assess the self-reported adaptability of

102   postgraduate dental learners and their instructors in the context of abrupt transition to

103   distance learning induced by the onset of the pandemic. The study's research questions were

104   as follows:

105   • How adaptable did the stakeholders under investigation perceived themselves to be?

106   • How did the stakeholders adapt their approaches (be it in relation to the learning and

107   teaching, or otherwise) to cope with the accelerated change?

108   • How can other postgraduate dental schools proactively raise the level of adaptability

109   of individuals and the all-encapsulating institutions?

110

Materials and methods

Context of the study

This study took place at the Mohammed Bin Rashid University of Medicine and Health Sciences (MBRU), Dubai, UAE in the Hamdan Bin Mohammed College of Dental Medicine (HBMCDM). This postgraduate dental college offers three-year full-time specialty dental postgraduate programs in prosthodontics, periodontics, pediatric dentistry, orthodontics, and endodontics.

Responding to COVID-19

HBMCDM, along with all other educational institutions in the UAE, switched to complete distance learning from 22nd March 2020 until the end of the respective academic year. Despite all the surfacing impediments, HBMCDM stakeholders managed to continue all didactic educational activities as previously scheduled (6).

Transitioning to distance learning

Two digital platforms were utilized to deliver distance learning, the Learning Management System (LMS) and Microsoft Teams. These platforms enabled real-time class presentations, research dissertation-related communications, and clinical case-based discussions (CBD). In addition, some instructors pre-recorded their lectures for learners to access and 'consume' the content at their convenience.

MBRU Faculty Development and Information Technology (IT) support teams conducted training sessions and designated technical support personnel to assist the faculty throughout the transition. Although a previously set schedule for the delivery of all didactic courses was

132   maintained, the instructors limited the sessions' length to one hour each. They provided

133   reading material before the teaching sessions to deliver the lessons' intended learning

134   outcomes within the shortened duration. Class attendance was registered on MBRU Self-

135   Service portal. To partially compensate for the lack of clinical learning due to the suspension

136   of clinics, CBD was delivered on MS Teams across two four-hour sessions per week.

137   Due to the absence of live proctoring and the inability to conduct final examinations on-

138   campus, instructors were encouraged to consider alternative assessment methods that test the

139   attainment of the courses' learning outcomes and hold the learners accountable to academic

140   integrity. Instructors were encouraged to conduct assessments orally using clinical scenarios,

141   especially in complex multidisciplinary cases via MS Teams. The LMS system, through

142   which written exams were conducted, adopted a lockdown browser requirement preventing

143   access to any other application during the exam. Also, activation of the webcam, in the

144   learners' devices, was required. Adequate training and support were provided to both learners

145   and instructors on using the additional exam security requirements mentioned.

Research design

147   The study's ethical approval was granted by the MBRU, Institutional Review Board

148   (Reference # MBRU-IRB-2020-032). As part of a multi-phased research project, this

149   convergent mixed methods study design (24) was adopted to develop a thorough

150   understanding of the extent of adaptability of the learners and their instructors during the

151   rapid transition to distance learning due to COVID-19. To start with, the qualitative and

152   quantitative data were concurrently collected (from both groups of stakeholders: instructors

153   and learners). The quantitative datasets were analyzed independently from the qualitative

154   datasets. Then, the generated information was integrated relying on joint model analysis (25,

155   26).

9

Data collection

The data was collected using a survey that was designed specifically for this research project.

The survey was composed of two segments. The first segment constitutes four components measured against a Likert-type scale of five points (1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, and 5: Strongly Agree). The 4 components are as follows:

1. I was able to effectively cope with the higher technological demands of distance learning.
2. I was able to manage my time and efforts to cope with the transition to distance learning.
3. I was able to monitor and evaluate my performance, and if need be- intervene, to cope with the transition to distance learning.
4. I sought help, if needed, from students, colleagues, University staff, and/ or family members to cope with the transition to distance learning.

The second segment of the survey was meant to be exploratory to solicit for qualitative data using the following open-ended questions:

- How did you feel about the transition to distance learning at the beginning?
- How do you feel about the transition to distance learning now that some time has elapsed?
- How did you cope with the transition to distance learning (related to the learning experience, or otherwise: personal-level, environment, and friends and family)?
- Reflect on the changes to your teaching approach due to the transition to distance learning.

10

178 All full-time and part-time faculty involved in the distance learning at HBMCDM were

179 invited to participate. Students from the five different postgraduate programs in all three

180 levels were also invited to participate. No personal identifiers were recorded to ensure the

181 privacy and confidentiality of all participants. The participation in this survey was completely

182 voluntary. The survey was open for learners and instructors for participation from May 1st

183 through 31st 2020. At the time of data collection, HBMCDM had 21 instructors and 63

184 students. The faculty was composed of 5 females and 16 males, with an average age of 48

185 years. The faculty were of 12 different nationalities, with the following distribution of

186 academic rankings: 4 professors, 5 associate professors, 5 assistant professors, and 7

187 lecturers. Nineteen were full-time and 2 were part-time employees. The learners consisted of

188 44 females and 19 males, distributed across 16 different nationalities, with an average age of

189 30.9 years.

190 The Strategy and Institutional Excellence team at MBRU (i.e., the unit handling the Quality

191 Assurance and Institutional Effectiveness portfolio) sent an email, with the survey link, to all

192 participants on May 1st. Weekly email reminders were sent out until the closing of the survey

193 on May 31st. Also, the Dean of HBMCDM sent emails to both the faculty and students'

194 groups independently to highlight the importance and value of voicing one's opinion through

195 participating in this survey.

Data analyses

Quantitative analysis

198 The quantitative data was descriptively analyzed using SPSS for Windows version 27. For

199 each of the four quantitative components, the mean and standard deviation were generated.

200 An overall score of adaptability was calculated.

11

201 Since the scale used for capturing the perception of the learners and instructors was tailor-

202 made for this study, the validity tests of Cronbach's Alpha and the Principal Component

203 Analysis (PCA) were performed to ensure internal consistency and check external variance,

204 respectively, of the adapted tool.

205 To select the appropriate inferential analysis test, a test of normality was conducted for each

206 of the four components and for the score of adaptability. The data of each of the four

207 components, independently, and the score of adaptability all turned out to be not normally

208 distributed. Accordingly, the Mann-Whitney test was used to compare the overall score of

209 adaptability, and each component independently, between both groups of stakeholders

210 (learners and instructors).

Qualitative analysis

211

212 The qualitative data analysis started after the completion of the data collection phase. The

213 data was inductively analyzed using thematic analysis. The process of analysis followed

214 Braun and Clarke (2006) (27) six-step framework, which is a recommended approach for

215 thematic analysis in health professions' education (28). The indicated six steps for conducting

216 thematic analysis include: 1- familiarizing oneself with the data, 2- generating initial codes,

217 3- searching for themes, 4- reviewing themes, 5- defining and naming themes, and 6-

218 producing the report.

219 NVivo software version 12 plus (QSR International Pty Ltd, Vic, Australia) was used to code

220 the data, and in turn, facilitate the categorization of the relevant text fragments. The data

221 collected from each of the two groups of stakeholders was handled separately.

222 First, two researchers (FO and FAR) familiarized themselves with the data by examining and

223 re-examining the qualitative data. Second, the qualitative, narrative data was examined line-

224   by-line and initial codes were generated. The two researchers underwent several rounds of

225   discussions to resolve any discordances between their observations. Third, the initial codes

226   were inductively investigated to be combined into subthemes, which in turn went through a

227   similar iterative process to construct themes. The generated themes and sub-themes were then

228   reviewed as part of stage four to ensure that the data within each compartment (i.e., theme or

229   subtheme) are sufficiently common and coherent, also the compartments are adequately

230   distinct from each other. As part of stage five, themes and subthemes were coded and defined

231   in the context of the study. The last step constituted of reporting upon the findings of the

232   qualitative analysis.

Mixed Methods Integration

233

234   After completing the independent quantitative and qualitative analyses, the outputs were

235   systematically integrated via joint display analysis. This involved merging the results from

236   the two datasets through a side-by-side comparison to assess the best way to map the findings

237   onto each other. This iterative process enabled developing a whole that is greater than the

238   sum of its parts (24, 29). As such, the convergence of findings led to the development of a

239   better understanding of the adaptability of learners and instructors during the transitioning to

240   distance learning.

241   The Pillar Integration Process (PIP) framework, initially presented by Johnson et al. (2017)

242   (30), was selected as the foundation of the adapted joint display analysis. The four stages of

243   PIP were completed sequentially: 1- presenting the quantitative raw data and findings on the

244   left side of the display, 2- exhibiting the qualitative raw data and findings on the right side of

245   the display (establishing links between both sides of the display where possible), 3-

246   confirming that both sides of the display match each other (as much as possible), and 4-

247   "pillar-building" which is the ultimate stage of this process leading to the generation of meta-

13

248   inferences which are position in the center of the display. As such, areas of data confirmation

249   (where findings from both datasets reinforce each other) and data expansion (where a finding

250   from one type of analysis is unique and has no match in the other type of analysis, but rather

251   expand upon it by establishing complementarity) were identified.

Results

253   The final respondents' number was 53 out of 63 learners (i.e., response rate was 84%). As for

254   the instructors, 18 faculty members out of 21 responded (i.e., response rate was 86%). A

255   unique identification number was given to each of the 71 participants. It was complimented

256   with 'R' for the learners and 'I' for the instructors (i.e., participants 1 through 53 were

257   followed by 'R', and 54 through 71 by 'I').

Quantitative analyses

259   The reliability score of Cronbach's Alpha for the evaluation instrument, which captured the

260   stakeholders' perception, was 82.4%. The percentage of the total average of the learners,

261   instructors, and both groups of stakeholders were 78.3%, 89.7%, and 81.15%, respectively, as

262   per Table 1.

263   Table 1 Output of descriptive quantitative analysis

Stakeholder:		Learners			Instructors			Both Groups of Stakeholders		
Component		Mean ±SD	Percentage of the Mean	Category	Mean ±SD	Percentage of the Mean	Category	Mean ±SD	Percentage of the Mean	Category
1	I was able to effectively cope with the higher technological demands of distance learning.	4.08 ±0.81	81.6	A-SA	4.56 ±0.51	91.2	A-SA	4.20 ±0.77	84	A-SA
2	I was able to manage my time and efforts to cope with the transition to	3.79 ±0.99	75.8	A	4.56 ±0.71	91.2	A-SA	3.99 ±0.98	79.8	A

15

	distance learning.									
3	I was able to monitor and evaluate my performance, and if need be- intervene, to cope with the transition to distance learning.	3.81 ±0.86	76.2	A	4.44 ±0.62	88.8	A-SA	3.97 ±0.85	79.4	A
4	I sought help, if needed, from students, colleagues, University staff, and/ or family members to cope with the transition to distance learning.	3.98 ±0.75	79.6	A	4.39 ±0.70	87.8	A-SA	4.08 ±0.75	81.6	A-SA
Total Average/ Score of Adaptability:		15.66 ±2.77	78.3	A	17.94±1.76	89.7	A-SA	16.23±2.73	81.15	A-SA

264   A= Agree, SA= Strongly Agree

265   According to the PCA, 87.1% of the variance can be explained by the instrument, which

266   means the instrument is reliable and valid to measure what it is intended to measure.

267   As illustrated in Fig 1, the instructors, with a mean of satisfaction of 17.94($\pm$1.76), rated their

268   adaptability higher than the learners, with a mean of satisfaction of 15.66($\pm$2.77) (p=0.002).

269   Fig 1 Comparison between percentages of the mean per component (1 through 4) between

270   learners and instructors

271

Qualitative Data

272

273 The thematic analysis resulted in two interrelated themes: Self and Environment, as

274 illustrated in this study's conceptual framework (Fig 2). Within the Self theme, three

275 interrelated subthemes surfaced: Cognitions, Emotions, Behaviors. As for the Environment

276 theme, it encapsulated two subthemes: Enablers and Impediments.

277 Fig 2 Study's Conceptual Framework

Theme 1: Self

278

279 This theme focuses on intrapersonal factors that appeared to influence the learners' and/ or

280 the instructors' adaptability.

Cognitions

281

282 This subtheme refers to thought processes that the individual learners and instructors seemed

283 to be experiencing. These thoughts appeared to be related to oneself, other people, and/ or the

284 context of experience.

285 Oneself (including meta-cognitions)

286 The stakeholders appeared to be judging themselves. They have somehow developed an

287 opinion about how well they adapted to the situation.

288   L-9: "…I adapted and performed much better than I expected…"

289   I-19: "…I believed in myself; I was confident about my abilities to successfully

290   transition to distance learning…."

17

291   In many instances, the learners and instructors appeared to be interpreting their own thoughts

292   and understandings during the transition to distance learning.

293   L-10: "…I could not stay focused for long periods of time…"

294   L-31: "…most of the time, I was not able to focus my thoughts. I frequently

295   experienced brain fogs...."

296   I-11: "…I was quite confused, at the beginning. For example, I was not sure if I

297   needed to look at the laptop camera or at the screen where my presentation was shared

298   from my desktop…"

299   Other people

300   The study participants reflected upon their own thoughts and opinions about others.

301   L-5: "…not sure if other students were paying attention during the lectures…"

302   I-11: "…at the beginning, I was doubting the students' engagement…"

303   I-12: "…I think we became more interactive, over time. At the beginning, it was a

304   challenge to both groups of stakeholders: the instructors and students. Eventually, we

305   comprehended what a virtual classroom is…"

306   Context of experience

307   The participants also discussed their views around aspects related to their environment and

308   the context of the experience. Some learners perceived the distance learning experiences to be

309   difficult:

310   L-16: "…I found the experience to be quite challenging; I could not concentrate at

311   home. It is not the right place to attend a class from..."

18

312   L-46: "… distance learning is sort of different from that which happens on campus in

313   terms of motivation and interactions..."

314   I-11: "…the idea of finding myself on my own in my room, interacting with a screen

315   was quite challenging…"

316   Others showed openness to and acceptance of the new experiences. They were grateful to the

317   fact that the virtual environment enabled the continuation of learning in a time when in-

318   person activities became unsafe.

319   L-9: "…it has been a pleasant new experience… I was intentional about adapting to

320   the reality of the situation. I perceived it to be to our own benefit…"

321   L-45: "…at the beginning I was wondering how it will be. Later, I got surprised by

322   how smooth the transition was…"

323   I-7: "…the distance learning was the best available alternative…"

324   I-9: "…the online teaching experience bought with it plenty of new opportunities. It

325   has broadened the scope of learning and teaching…"

326   *Emotions*

327   This theme sheds light on the emotions that the participating learners and instructors

328   experienced in adjusting to the distance learning and teaching. Some emotions were positive,

329   and others were negative.

330   Positive (including motivational affects)

331   The study participants expressed several positive emotions:

332   L-7: "…I felt excited about trying this new experience…"

333   I-19: "…I am happy about all facets of distance learning…"

334   Negative

335   The stakeholders also expressed negative emotions. Its sudden onset and all the uncertainty

336   around it were quite disturbing to some learners and instructors.

337   L-17: "…I was doubtful..."

338   I-6: "…I felt slight apprehension..."

339   I-8: "…I felt skeptical about the feasibility of the transition and maintenance of

340   distance learning. How are we supposed to acquire the needed skills virtually? We are

341   meant to become clinicians after all…"

342   Several learners referred to an elevation in their level of anxiety. Besides worrying, the

343   learners also expressed anger, frustration, and changes in energy levels. Between caretaking,

344   housework, kids' homeschooling, and learning, some found personal and professional time

345   blended.

346   L-2: "…I experienced feelings of frustration and exhaustion- there were many

347   competing responsibilities, all taking place at home..."

348   L-3: "…I felt confused. Also, I got frustrated due to the many internet-related

349   problems that I faced. This led to time management issues..."

350   L-46: "…I felt anxious, but I had trust that MBRU will find a way around the

351   challenge, and will continue on providing us with the best…"

20

352 *Behaviors*

353 This theme encapsulates all the different actions that the stakeholders partook to adapt to the

354 change. It also included all the skills needed to exercise to keep up with the challenges

355 inherent in the transition. The stakeholders differentiated between the behavioral changes that

356 turned out to be conducive and those that appeared to them not to add any value to their

357 experiences.

358 Constructive

359 Among the actions that were deployed, some turned out to be to the advantage of the learners

360 and instructors. Some learners proactively developed opportunities to connect with peers;

361 their engagement in virtual study groups added value to their learning strategies during the

362 transition to distance learning.

363   L-14: "…I developed the habit to regularly meet with my colleagues online to study

364   the lectures together…"

365   L-15: "…participating in group study was one of the best ways to keep distance

366   learning as similar as possible to that of typical conditions…."

367 The learners also developed and deployed their time management skills.

368   I-7: "…I had to adjust my schedule to make better use of my time…"

369 Also, some learners were intentionally more engaged in the virtual context, relative to face-

370 to-face interactions.

371   L-47: "…I started reading and researching more. I also developed the habit to prepare

372   for the lectures, before the actual time the classes take place..."

21

373   L-7: "…I focused on preparing for the lecture ahead of time, and I maximized my

374   participation during the meeting. It was clear that our instructors were trying their best

375   to make-up for the interpersonal gap. When I have a lecture to present, I try to have to

376   have pauses every now and then with a funny slide or so to refresh the energy of my

377   colleagues..."

378 Instructors adjusted their teaching strategies to engage learners. They adopted techniques to

379 foster meaningfulness in their connection with the learners and overcome physical and

380 emotional isolation.

381   I-11: "…I started to share more links, videos, and reading materials with my residents

382   to further support their learning. We arranged for online meetings on Teams to discuss

383   their research projects, and address and reflect upon inquiries related to their

384   presentation…"

385   I-12: "…our residents stayed in touch via WhatsApp groups that were created during

386   the lockdown. It made connecting with and updating each other easier…"

387 Some stakeholders realized that they were proactive in modifying their physical environment

388 at home for it to become more conducive to their learning and teaching targets.

389   L-22: "…I arrange a studying set-up at home… I made the effort to change this set-up

390   from time to time…"

391   I-11: "…allocating a working space at home was also very helpful. I get into my work

392   mode as soon as I land on this desk…"

393   Futile

394   In their attempt to cope with the transition, some stakeholders resorted to behaviors that did

395   not add value to their experience. Learners were suddenly faced with many responsibilities

396   that they needed to attend to concurrently from the same space. A few of those learners

397   seemed to deal with all their responsibilities as one chunk, without any sort of

398   compartmentalization.

399   L-12: "…It has been difficult to suddenly be required to manage both family and

400   university at once, in the same place…"

401   Other learners could not bear the fear and uncertainty inherent in the situation and ended up

402   overworking themselves as a coping mechanism.

403   L-7: "…the transition and isolation, and all the accompanying stress and fear are

404   making me spend most of the time studying, which is getting quite stressful. I barely

405   have any time left for myself. What I used to finish in one hour, now takes me 3

406   hours…"

407   Some learners needed to lessen their level of interactions to deal with their anxiety and

408   insecurities.

409   L-24: "…I was hesitant to participate in the class unlike in the normal class setting I

410   would have been more interactive…"

411   **Theme 2: ENVIRONMENT**

412   This theme refers to external factors that the stakeholders perceived to have affected the

413   learning and teaching experience positively or negatively.

23

414 *Enablers*

415 Among those external variables that the stakeholders shed light on were ones that inspired,

416 enabled, and/ or empowered the learners and their instructors. For example, the stakeholders

417 particularly emphasized that the understanding of family members was crucial for effectively

418 transition.

419   L-21: "…the most important thing that my family understand the situation and do not

420   interrupt me during my classes…"

421 Also, relying on family and friends for support and comfort was frequently brought-up by the

422 study participants. The role of close family members appeared to be quite helpful in

423 facilitating the individual-level adjustments that needed to take place.

424   L-47: "…it was not very difficult to cope on my own; my family was supporting and

425   comforting me all the time…"

426   I-9: "…I coped well; thanks to good friends and family…"

427 In some cases, the instructors shed light on how the fact that they had rapport with the

428 students enabled and smoothened the transition.

429   I-11: "…I think it is more convenient to move to distance learning after knowing the

430   residents and they get to know you through face-to-face interaction…"

431 The participating stakeholders highlighted that one of the significant external resources was

432 the educational institution itself. This included how the institution led the transition and

433 provided all different kinds of support at various institutional levels to both learners and

434 instructors.

24

435   L-24: "…the university was very cooperative…the instructors made me feel at ease,

436   my colleagues kept on sharing with me stories of the obstacles that they had to go

437   through and how they overcame them…."

438   I-12: "…the transition has been managed professionally by MBRU leaders and staff

439   members, along with faculty members and other stakeholders who are directly

440   involved in the learning and teaching. I perceive the transition to have happened

441   smoothly..."

442   I-15: "…transition was a lot easier than I expected; thanks to Information Technology

443   team support…"

444   *Impediments*

445 The stakeholders also identified external variables that they felt held them back, discouraged

446 them, and/ or slowed them down. For example, learners indicated the challenge of the

447 competing responsibilities that arose because of the pandemic and that needed to be attended

448 to concurrently from the same physical space. They needed to strike a balance between

449 keeping up with their educational duties and their personal and/ or familial life.

450   L-2: "… personally, I have no free time to read any supplementary material assigned

451   by my instructors. I am always busy; we have to be available 24 hours a day, 7 days a

452   week for anything or everything at home…"

453   L-3: "…it was quite challenging in the beginning. I could not continue having a part-

454   time homecare nurse to support me with taking care of my father. Her part-time

455   constituted a risk in terms of transferring the virus in between her multiple work

456   duties…"

25

457   L-38: "…All of a sudden, I needed to keep an eye on my kids of 5 and 3 years of age,

458   along with homeschooling them, while living-up to my learning obligations..."

459   L-25: "…I disliked it! I am a mother and having my kids around does not make it

460   easy to focus. My kids need home schooling and supervision while I am having my

461   classes…"

462 Some stakeholders considered that the lack of opportunities of hands-on and clinical

463 experiences constitute a hindrance or obstruction towards their learning or teaching

464 objectives.

465   I-2: "…in some areas it was ok, but others require interaction with students and

466   hands-on experience..."

467   L-5: "…I miss my clinical work and patients, which is demotivating me..."

468 The sudden transition to the online environment accompanied by the isolation due to the

469 social distancing directives constituted to almost all participants an external challenge that

470 they needed to overcome. Some of the learners mentioned the loss of connection with others

471 due to isolation. There were also the inevitable adverse effects of using electronic devices for

472 long periods, which caused digital eye strain and/ or headaches among the learners.

473   L-14: "…it was hard to study at home sometimes, due to isolation. Studying on my

474   own without my colleagues really affected me…"

475   L-14: "…I noticed that I was regularly experiencing headaches while studying from

476   home, which was not the case prior COVID-19. These episodes were maybe induced

477   by the heavy reliance on technologies and electronics…"

478   Disruption of daily routine and its consequences were repeatedly referred to by the learners

479   and instructors. The switch to digital learning also resulted in sleep deprivation among our

480   stakeholders. This, in turn, generated fatigue and in some cases burnout; the stakeholders

481   observed that they were stretching themselves too thin.

482   L-2: "…the changes to my routine and increasing responsibilities were accompanied

483   with lack of sleep. My lifestyle has not been healthy and there is very little that I can

484   do about it..."

485   L-7: "…my personal space got conquered; I do not have the time now to recharge my

486   own energy…"

487   I-5: "…not having a real break. It can get really tiring. With the lectures and meetings,

488   I feel like I have been working 24/7..."

Mixed Methods Integration

490   The PIP joint display visually conveys the inferences of the quantitative and qualitative

491   analyses and meta-inferences generated by merging the outputs of both analyses. As depicted

492   in Table 2, it is evident that the stakeholders perceive themselves to have adapted well to the

493   transition, where the qualitative and the quantitative output of data analyses confirm each

494   other. Relevantly, the quantitative analysis also revealed that the instructors perceive

495   themselves to be adaptable significantly more than how adaptable the learners perceive

496   themselves to be. These findings appear to complement the qualitative findings that there is

497   an interplay between the cognitions, emotions, and behaviors on the level of the self as part of

498   the adaptation process. Also, on its own, the qualitative findings shed light on the fact that the

499   stakeholders considered the environment to play an essential role in their adaptation process,

500   where they pinpointed enablers and impediments.

Table 2 The study's joint display (merging of the quantitative with the quantitative output of analyses)

	Quantitative→	Pillar (Meta-inferences)	←Qualitative		
Output of Analysis	**Key Findings**		**Key Findings (Conceptual Framework)**	**Findings**	
				Learners	**Instructors**
  Percentages of the mean (of self-reported adaptability) per component 84% — I was able to effectively cope with the higher demands 80% — I was able to manage my time and efforts 79% — I was able to monitor and evaluate my performance, and if need be- intervene 82% — I sought help, if and when needed * The instructors, with a mean of satisfaction of 17.94(±1.76), rated their adaptability higher than the learners, with a mean of satisfaction of 15.66(±2.77) (p=0.002).	Learners and instructors perceive themselves to have adapted well to the rapid transition	• There was an evident interplay between cognitions, emotions, and behaviors that enabled the stakeholders to adapt to the abrupt change. • The modifications in behaviors were the most obvious and easiest to identify. • From the stakeholders' perception, the instructors appeared to be at an advantage in adapting to the abrupt change.	**Self** — Cognitions	L-31: "…most of the time, I was not able to focus my thoughts. I frequently experienced brain fogs…."	I-19: "…I believed in myself; I was confident about my abilities to successfully transition to distance learning…."
	Instructors perceive themselves to be adaptable significantly more than how adaptable the learners perceive themselves to be		Emotions	L-7: "…I felt excited about trying this new experience…"	I-6: "…I felt slight apprehension..."
	In terms of action/ behavior/ skill, stakeholders perceived themselves to have managed their time and efforts, monitored and evaluated their performance (and if need be- intervened), and sought help (when and if needed)		Behaviors	L-47: "…I started reading and researching more. I also developed the habit to prepare for the lectures, before the actual time the classes take place..."	I-12: "…our residents stayed in touch via WhatsApp groups that were created during the lockdown. It made connecting with and updating each other easier…"

		• Attributes of the environment (be it the Enablers or the Impediments) were clear to have played an active role in the adaptation process	Environment	Enablers	L-24: "…the university was very cooperative…the instructors made me feel at ease, my colleagues kept on sharing with me stories of the obstacles that they had to go through and how they overcame them…."	I-9: "…I coped well; thanks to good friends and family…"
–	–			Impediments	L-14: "…I noticed that I was regularly experiencing headaches while studying from home, which was not the case prior COVID-19. These episodes were maybe induced by the heavy reliance on technologies and electronics…"	I-5: "…not having a real break. It can get really tiring. With the lectures and meetings, I feel like I have been working 24/7..."

502   Legend: The Joint Display visually demonstrates how the output of analyses (as depicted in the Quantitative and Qualitative Results

503   sections) and their corresponding findings (as inferred by the authors from the Results sections of the respective analyses) were mapped onto

504   each other, using Pillar Integration Process.

505   Each sub-theme of the study's conceptual model (i.e., the output of qualitative analyses) was coded with one of the three primary colors:

506   Yellow, Blue, and Red. All three sub-themes belonged to the overarching 'Self' theme coded in Brown as a representation of the mixing or

507   blending of the three primary colors. Three components of the quantitative analysis are coded in Red because they correspond to the

508   Behavior sub-theme in the qualitative analysis. One of the four components of the quantitative data collection tool is more generic referring

509   to coping through the transition and is hence represented as Brown (referring to the interplay between the three sub-themes).

510   The second theme of the study: 'Environment' is unique to the qualitative analysis (where no matching counterpart was identified in the

511   quantitative analysis). Hence, in the diagram, this is represented as a dash). This theme is exclusive from the other theme and hence (despite

512   its importance) we chose to differentiate it visually by keeping it without a distinct color.

513

Discussion

514

515   This study reinforced the notion that students are self-regulated agents who can manage their

516   learning (31). It also taps into the roles that positive and negative emotions play in SRL (32),

517   and the belief (initially suggested by socio-cognitive theory) that individuals acquire

518   knowledge by observing others and social interactions (33, 34). Both groups of stakeholders

519   perceived themselves to have adapted quite well to change. Also, the instructors perceive

520   themselves to be at an advantage relative to the learners in terms of adapting to the abrupt

521   change induced by COVID-19.

522   This study demonstrated SRL as a cornerstone in the adaptation to the accelerated change

523   (accompanying COVID-19) in health professions' education of the individual learners and

524   their instructors. Both groups of postgraduate dental education stakeholders (the learners and

525   instructors) experienced and reported variation in their cognitions, emotions, and behaviors.

526   There was an evident interplay between these individual-level variables, which enabled the

527   stakeholders to adapt to the abrupt change. The stakeholders in the current study also

528   highlighted attributes of the environment that they believe have played a role in their

529   adaptation processes. Along those lines, a recently conducted cross-sectional study aimed at

530   investigating the associations between adaptability, personality, and levels of learning

531   (affective, cognitive, and behavioral) among university students, revealed that adaptability to

532   the pandemic was associated broadly with more positive reactions across multiple indicators

533   (10). This study emphasized the role of adaptability in learning. It appeared that adaptability

534   is acting as a mediator in the association between personality characteristics (i.e., openness,

535   conscientiousness, extraversion, agreeableness, and neuroticism) and students' reactions to

536   online learning. The more adaptable the students perceived themselves to be, the more

537   constructive were the learning experiences that they reported upon. Moreover, in the same

538   study, the students who reported greater feelings of belonging and mattering perceived

539   themselves to be more adaptable and reported more positive reactions to the learning

540   experiences. This finding highlights the importance of 'connection to others' when it comes

541   to online learning. Hence, it is essential for university-level mental health promotion

542   activities to strive to foster adaptability and build 'academic resilience', among students,

543   through tapping into elements of self and identity (i.e., internal resources). It is of utmost

544   importance for the students to feel that they belong and matter to other people (i.e., external

545   resources).

546   The inclusion of instructors in the SRL that takes place in the process of adapting the learning

547   and teaching to accelerated change is not unique to this study. It was previously suggested

548   that the experiential learning that health professions students go through usually entails

549   "strong emotions". A key responsibility of facilitators of such learning experiences is to

550   harness an environment of trust, authenticity, mutual respect, and integrity (35). This,

551   according to Brookfield (1995), requires educators to be "adult learners", above all,

552   continuously updating, expanding, and deepening their professional perspectives both on

553   their roles and responsibilities and in relation to the subject matter. He reminds educators that

554   they are required to revisit and analyze their own "visceral" experiences by virtue of their

555   profession before asking their students to do so (36).

556   The evidence-driven conceptual framework generated from this study confirms the

557   commonality across existent models of SRL and builds upon them (22). These models shed

558   light on the aspects of the self that come together to enable SRL. These include cognitive,

559   metacognitive, behavioral, motivational, and emotional aspects. Similarly, this study

560   highlights the interplay between cognitions (involving metacognitions), emotions (including

561   motivation), and behaviors, along with emphasizing the effect of the all-encapsulating

32

562   environment. It offers insight into the context: variables that enabled the individuals'

563   adaptation and those that impeded it. It was previously highlighted that contextual factors

564   impact how students feel a sense of relatedness to their colleagues and instructors (10). All

565   this aligns with the triadic analysis of SRL, which focuses on the relationship between the

566   person, behavior, and environment (37). From the constructivism perspective of experiential

567   learning (i.e., learning through reflection on experience), individuals construct their

568   knowledge through interactions with their environments (35). Individuals in this study

569   appeared to be continuously receiving information from the context and adapting their

570   strategies accordingly. All these insights can be leveraged by other postgraduate dental

571   schools to proactively raise the level of adaptability of individuals, and to create

572   environments that are malleable and conducive to learning goals.

573   This study shows that the tailor-made quantitative tool is internally reliable and externally

574   valid in the context of this study. There are several tools published in the literature that are

575   designed to measure self-reported adaptation and/ or coping with change including the

576   Coping Strategy Questionnaire (CSQ)(38), Coping Orientation to Problems Experienced

577   (COPE) inventory (39), and its abbreviated version, the Brief COPE (40).

578   These tools proved of great usefulness across several contexts yet are considerably thorough

579   and time-consuming. There are relevant tools that are more succinct in measuring resilience

580   such as the Brief Resilient Coping Scale (BRCS) (41) and the Brief Resilience Scale (BRS)

581   (42). Yet, none are contextualized to accelerated changes to medical education (including but

582   not limited to the abrupt transition to the online environment) during critical times (such as

583   COVID-19), and factor qualitative reflections into the equation. Accordingly, this study

584   bridges this gap by introducing a concise data collection tool that directly taped into how

585   postgraduate dental students regulated themselves and maneuvered through the exceptionally

33

586   VUCA environment of COVID-19. Also, the instrument developed and deployed in the

587   current study inquired for qualitative data, which encouraged participants to reflect on their

588   experience. This proved to be of great added value to better understand the processes that the

589   stakeholders went through to self- and co-regulate and in turn thrive.

590   It is worth noting in terms of the participants' self-awareness, the modifications in behaviors

591   were the most obvious and easiest to identify in this study. Along those lines, in another

592   exploratory study during COVID-19 (6), modifications in learning (among the learners) or

593   teaching (among the instructors) were also apparent, where learners and instructors modified

594   their approaches to adapt to the rapid transition to distance learning. Such findings that offer

595   insight into the organic growth and development that is inherent to the adaptation process

596   constitute empirical evidence supporting Zimmerman's cyclical model, which suggests that

597   SRL is a process that involves forethought, followed by performance, and finally, self-

598   reflection (43). Moreover, as evident in the qualitative exploration integral to this study,

599   negative thoughts and emotions surfaced for the stakeholders, whether they were aware of it

600   or not. It is worth highlighting, over here, the importance of building an environment where

601   individuals feel safe to experience, and in turn, let go of these emotions (44). The fact that

602   such negativity surfaces is not unexpected given the VUCA of the situation. The more we

603   empower higher education stakeholders to acknowledge (i.e., become aware of), accept (and

604   respect), and experience (and in turn process) their emotions and thoughts, the less resistant

605   and more adaptable to change they will become (45, 46). This is directly related to fostering

606   cognitive flexibility, which is defined as the ability to adapt the cognitive processing

607   strategies to face new, unexpected, and uncertain conditions in the environment (47, 48)

608   The current study is characterized by a few caveats that are worth shedding light on. It relied

609   mainly on self-reported data. Each of the two groups of stakeholders provided some reflective

34

610 data on the other party's adaptability. It would be interesting for follow-up studies to further

611 explore this point-of-view by systematically enabling observer rating. This will allow for

612 comparing how the perception of one's adaptability maps onto how others perceive one's

613 adaptability. Moreover, in alignment with the principles of the Institutional Research function

614 at MBRU, complete anonymity of the participating university stakeholders was maintained.

615 Therefore, demographic details of the participants (e.g., gender and age) or that relating to

616 their affiliation with the university (e.g., year of study and academic title) were not recorded.

617 It would have been interesting to investigate the association between the stakeholders' extent

618 of adaptability and those variables. Also, although this study offered a lot of insight into how

619 the stakeholders perceive themselves and each other when it comes to adaptability, its cross-

620 sectional design did not enable investigating causality. Hence, it will be great for future

621 studies to be based on longitudinal designs, where potential antecedents to adaptability are

622 captured. The findings of such studies will have substantial practical implications where

623 higher education decision-makers will get a better grasp as to what variables they can foster

624 to proactively raise the level of adaptability among their stakeholders. The study offered a lot

625 of value through the open-ended questions integral to the survey in terms of exploration. Yet,

626 we believe it is worth deploying alternative data collection tools (e.g., focus group sessions)

627 to develop a more thorough understanding of the adaptability experiences of the stakeholders.

Conclusion

629 This study encourages opinion leaders in higher education institutions to leverage SRL

630 theories to proactively inspire and empower the learners and their instructors. It also reveals

631 the importance of developing and maintaining safe and nurturing learning environments that

632 foster connection and mattering (to one another), enable cognitive flexibility, and build

633 academic resilience.

Conflicts of interest

635 The authors confirm no conflicts of interest.

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756

Percentages of the mean (of self-reported adaptability) per component

Component	Learners	Instructors
1	81.6%	91.2%
2	75.8%	91.2%
3	76.2%	88.8%
4	79.6%	87.8%
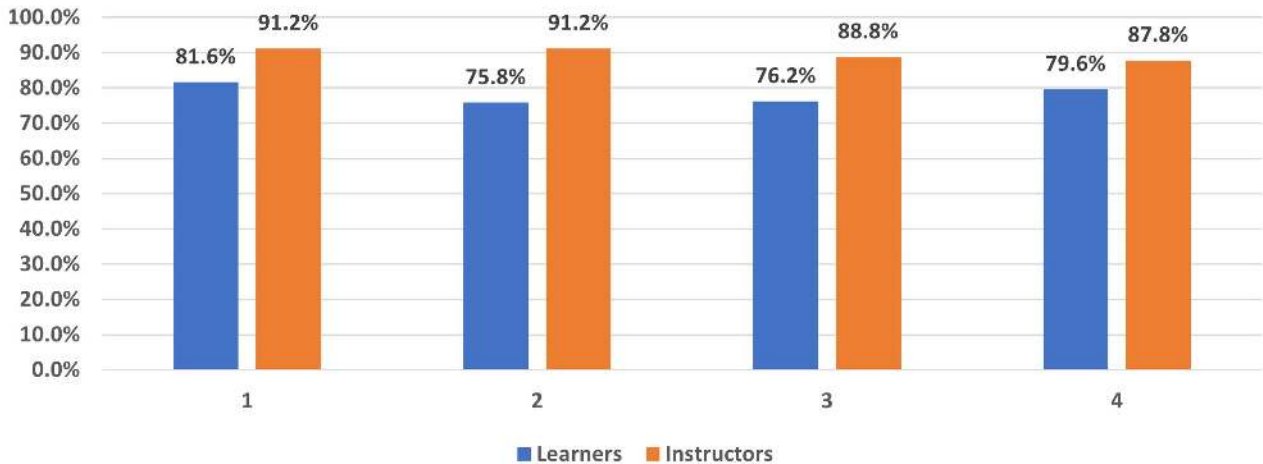
ENVIRONMENT

Behaviors

Cognitions

SELF

Emotions