

Students' Practical Skills Development in Online Education in Covid-19 Context

Eugen Florian POPESCU

Psychologist, Engineer. MSc Student at Faculty of Psychology and Educational Sciences,
University of Bucharest, 050657, Bucharest, Romania

Abstract

The study focuses on the evolution of the students' development of practical skills in online education, while analyzing the variations occurring in relation to criteria such as: didactical profiles/specializations, learning stage, specificities of the context of practice/ laboratory classes, individual autonomy and instructor facilitation.

Particularly, we analyze the importance of individual autonomy in the learning process in online education, especially for the development of practical skills – a process that seems to be strongly affected by the lack of physical experiential context.

The research is based on an interview with 16 open-ended questions, conducted with 25 students uniformly distributed in undergraduate and master's university cycles, having both technical and humanities profiles.

We describe the variables conditioning the students' development of practical skills in the online education, taking also into consideration that the shift from classical to online education has been done abruptly and with no time buffer for adaptation. Finally, further research perspectives regarding the learning process in online context are presented.

Keywords

Online education, Practical skills, Learning process, Covid-19

1. Introduction

Preliminary research has been conducted regarding the evolution of students' well-being and learning process in online education in Covid-19 context, emphasizing that students experience a decrease in the quality of well-being, mainly due to the lack of physical (didactic and social) interactions and to the tiredness generated by overloading with tasks and homework. In the same time, they take profit of the technological advantages that offer them the opportunity to grow autonomously. [Popescu et al., 2021]

Some gaps have remained in our previous findings, that needed to be further explored, into a more narrow study related to the evolution of students' practical skills development in online education. Along with this main topic, some particular aspects related to students' well-being and individual autonomy still needed to be tackled, to complete an overall image of the students' learning dynamic in the online education occasioned by the Covid-19 pandemic.

As well, the representativeness of the subjects group needed to be increased, in order to allow the extraction of differentiators related to specific criteria, such as: didactical profiles/ specializations, learning stage, specificities of the context of practice/ laboratory classes, individual autonomy and instructor facilitation.

A proper knowledge on the students' learning process helps instructors and academic institutions to better prepare and adapt the educational context, in order to raise the efficiency of their decisions and activities in the future, to support the adjustment/ improvement of the online education and/or prepare the transition to a blended approach.

2. Research objectives

This study was constructed on the margins of the following objectives:

- i. To understand the evolution of the acquisition of practical skills in the online educational context, at university students level, while taking into account the differences between the undergraduate and master's degree cycle, respectively the differences between the technical and the human profile.
- ii. To observe the influence of students' individual autonomy on well-being and on the process of acquisition of practical skills.
- iii. To observe the way in which the students' acquisition of practical skills conditions the development of individual autonomy.
- iv. To understand the way in which collaboration and teamwork influence the students' acquisition of practical skills.
- v. To explore the relation of the use of alternative solutions to the physical context of practice, as well as of the instructor facilitation, with the students' acquisition of practical skills, in online education.

3. Hypothesis

The hypothesis set to be verified in this study is the following:

- The acquisition of practical skills in online education, compared to classical education, is more affected at the level of technical students than at the humanities ones.

4. Theoretical Framework

Theoretical research revealed that students' practical skills development is influenced as a matter of influence received both from direct factors (such as: communication and interaction with instructors and colleagues, course design, intrinsic motivation, inclination towards IT&C technology, open mindset towards research and exploration, individual autonomy) as well as indirect facilitators (such as: well-being and satisfaction, kinesthetic learning style, flexibility and adaptation, technical/contextual work conditions, time management, psychological anchoring, equal opportunities regarding access to learning experience). [Paudel, 2021; Yang&Cornelius, 2004; Kukreja et al., 2021; Eom & Ashill, 2016]

Extended insights on the evolution of students' practical skills development in online education context reveal that:

- Physical context for practice cannot be easily replaced in online education. It needs special adaptation to transpose, simulate and exhibit the practical experiences into the virtual context. [Co et al., 2021]. In many cases, this remains mostly a desiderate.
- Stimulation of free decision and cognitive initiative, as well as facilitation and support from instructor, have positive effects on the development of students' practical skills in online education. [Dee, 2021; Piyatamrong et al., 2021]
- Lack of emotional and personal (social) interaction, lack of olfactory and tactile stimuli, as well as lack of real-time observation of the practical phenomena, have a negative influence on the development of students' practical skills. [Flynn et al., 2021; Piyatamrong et al., 2021]
- Some advantages of online practice/ laboratory classes have been found, such as: the possibility of students to cover the learning materials and conduct experiments at their own pace, the diversity of information and tutorial sources on the Internet, and the flexibility to use them as a support during and outside the classes, to complement the official information and directions offered by the instructor. [Rice et al., 2021]

5. Methodology

Our research involved conducting an interview with open-ended questions, with the following characteristics:

- Topic of the interview: Specificities of practice/ laboratory classes and acquisition of practical skills by students in the context of online education generated by the Covid-19 pandemic.
- Hypothesis: The acquisition of practical skills in online education, compared to classical education, is more affected at the level of technical students than at the humanities ones.
- Items: 16 open-ended questions (found in Annex) that explored students' perceptions of practice/ laboratory classes, the process of acquiring practical skills, the importance of instructors in these processes, the importance of individual autonomy, and the evolution of well-being, in the context of online education.
- Participants: 25 students, with a relatively uniform distribution in the undergraduate and master's degree cycles (in the finishing years), and in the technical (engineering/ telecommunications and computer sciences) and humanities (psychology and education sciences) profiles.

6. Results

General aspects

- The hypothesis – according to which *the acquisition of practical skills in online education, compared to classical education, is more affected at the level of technical students than at the humanities ones* – was not confirmed. Both profiles are equally affected by the context of the online education, the acquisition of practical skills being dependent on objective factors which vary in different forms, relatively to the specifics of the practice context.
- Practice classes in the humanities (psychology and educational sciences), in general, are focused on working with people, individually or in groups, in approaches such as: educational transfer, personal development, therapy, collaboration. The physical practice space is characterized

by human physical presence and interpersonal contact, as well as by the existence of specific tools meant to facilitate experiences and implementation.

Due to the need to counteract the health risks caused by the pandemic crisis, the physical interaction context of practice classes at humanities profiles have been suppressed, leading to the obligation of conducting them in the online format.

Thus, the practice classes in the humanities have been replaced with various compensatory activities, including both indirect inter-human interaction (via video-conference), as well as theorizing the practical activities (through simulations, role-playing games, inter-collegiate exercises, case studies, debates on video recordings, imagining scenarios, creating and developing projects, teamwork).

- Laboratory courses in the technical fields (telecommunications and computer sciences) are generally dependent on physical tools, which consist of equipment (e.g. communication systems, antennas, computer network hardware equipment) and software applications (e.g. programming environments, development and simulation environments for technical processes).

Compared to the humanities, practice in the technical fields implies a lower inter-human interaction, from the perspective of health risks. For example, in the humanities area, a student should interact with the coordinating instructors from both the university and the collaborating institutions (e.g. schools, therapy centers, hospitals), respectively with the practice subjects (e.g. children in the classroom, therapy patients), thus weakening the efforts to counteract the pandemic. In the technical area, laboratory classes involve only the interaction of a small number of students and the instructor coordinating the activity. More so, the object of the practice classes is represented by technical tools, not by people.

Given these advantages, some technical universities have decided to recall students to the physical practice space, strictly for conducting laboratory classes which are dependent on physical equipment. In all the analyzed situations, the theoretical courses continued in online format, limiting the physical interaction strictly to the practice courses. In addition, the presence of students to laboratory classes have been made possible only when appropriate, depending on the low incidence of the spread of health risks in the University's region. The activities have been discontinued and moved back online entirely, once the pandemic situation and the community rules imposed it.

- Our research reveals that the acquisition of practical skills in online education is dependent on several variables, such as: practice tools, contextual nature of practical activity, facilitation by the instructor (conditioned, in turn, by: instructors' preparation, adaptation and competences, respectively by the technical working conditions and the administrative facilitation received from the educational institution) and the individual autonomy.

- **Depending on the practice tools**, we identify the following relationships that condition the acquisition of practical skills:

- If the tools are in a physical/ hardware format, then their replacement becomes very difficult (to nearly impossible). The acquisition of practical skills is strictly dependent on the presence and physical use of equipment, without which one cannot practice, experience and understand the functioning and variability of the physical phenomena described. Any software simulation environment (which could be perceived as a

surrogate for the replacement of physical equipment) offers only ideal situations, which do not properly describe the problem of real operation and deployment, with all the problems and situations specific to genuine experimental casuistry from physical space. Surrogate software simulation solutions deprive students of real experimentation.

- Also, if the practice requires inter-human interaction in the physical space - as is the case in the humanities - then the deprivation of physical experience suppresses the act of developing practical skills in students, as they do not have the actual training experience. Inter-human communication through physical interaction involves a transfer of information through multiple channels: verbal, non-verbal, para-verbal, contextual (relative to the environment, relative to the human presence of the group/ assistance/ observers), management of situational control, etc. The lack of physical space of practice suppresses the possibility for students to experiment, to understand and to assimilate the phenomenology of the processes for which they conduct the training.
- However, if the tools are informational (e.g. software environments, applications, cognitive work, information analysis), then the practice activities can be carried out in reasonable conditions, and the acquisition of practical skills is done similarly to the context of classical/ physical education.
- When working with people, **the conditions of online practice are dependent on the applied/ experiential or analytical/ cognitive character**. Therapy and developmental interactions, which require physical presence and experimentation (such as experiential psychotherapy, clinical psychology, speech therapy or early education), the acquisition of practical skills is closely linked to the living the authentic experiences.

Students/ practitioners cannot capture the plethora of information beyond the verbal communication channels, in order to be able to react appropriately and control the practice session. Also, they cannot make authentic contact with the subjects of practice, in order to be able to support, facilitate and coordinate the activity, especially when it implies emotional content and where direct support from the practitioner is needed.

Instead, interactions based on analysis and cognition (such as cognitive therapies, coaching, work based on information management) can be carried out satisfactorily in online conditions, as their degree of dependence on physical tools is lower. In this situation, it becomes important to carefully contract the experience, to properly set the beginning stage, in which the relationship of trust between the practitioner and the subject of practice is formed.

In order to gain the initial confidence/ trust of interaction, the auxiliary elements of the learning process must intervene, such as: the facilitation from the practice instructor or the creation of the appropriate (official, formal) practice context, by the educational institution.

- Also, in working with people, the age of the subjects of practice has a special importance for carrying out the practical activities. It is relatively easy for adults to communicate via video conferencing, especially if the activity is focused on informational content.

On the other hand, with children (especially at the young ages) it is very difficult to carry out practical activities through online tools, as the practice context involves a number of impediments, such as: high dynamics of the group of children, lack of ability to keep their attention on a fixed

point (i.e. computer screen) to interact with the student/ practitioner, lack of possibility for the student to observe the entire physical context in which the activities take place (e.g. in a preschool class, physical presence is mandatory for spontaneous observation of situations), lack of possibility to react quickly to spontaneous situations, lack of control of the student over the context of practice, a.s.o.

- No differences have been found regarding the evolution of the acquisition of practical skills, depending on the undergraduate and master's degree cycles.

Individual autonomy

- Individual autonomy offers students the benefit of a better individual organization of the learning process, by managing time according to their needs, organizing materials in a form adapted to their own learning style, managing the pace of learning within individual limits and abilities, and exploring informational content and helpful materials from the internet environment, at your own pace.

The individual living of experiences and stages of the learning process offers the students the chance to analyze the studied phenomena by their own, thus forcing them to filter and reason the informational contents. They have equal chances of access to practical information (compared to the situation of the physical context of practice), which they can explore individually, at their own pace. In the physical context of practice, the task of experimentation does not always fall equally to all students, this being only for the benefit of those who actually perform the practical tasks. In the online practice context, all students are required to go through the practical processes; even if experience is lower in quality than in the physical space, in the online environment it still offers increased and equal chances for each student to assimilate the skills and knowledge.

Leveraging the equality of opportunity created objectively by the online educational context is dependent on the degree of use and exploitation of individual autonomy.

- At the same time, the lack of personal initiative and awareness allows students not to capitalize on the space of freedom they have in online education, as instructors have a low degree of control over the students' learning process, in the absence of physical education context.
- The physical practice space imposes certain physical conditions which force students to pay attention to educational activities. Instead, the online practice space not only have no such conditions, but also offers students a number of distractions (such as the Internet, social media, entertainment, lack of psychological anchoring in the educational space) that can weaken their attention to the didactic content and can disturb their educational process.

Students must make a conscious, voluntary, directed and sustained effort to maintain their attention and presence in the online educational process.

- Students with a low degree of autonomy face difficulties in maintaining focus and in sustaining the educational process, thus requiring external support, guidance and motivation, from instructors and colleagues.
- Overall, we understand that individual autonomy has a significant influence on the process of acquiring practical skills in online education, both positively and negatively. The lack of physical social instructor-student interaction offers students a freedom of decision and movement that can

help them acquire skills and knowledge, or to weaken and decrease their level of training (depending on the degree of responsibility on the students' part).

- No differences have been identified in the variation of individual autonomy and its influence on the learning process (both from the perspective of acquiring knowledge and practical skills) at students, depending on their specializations/ profiles. There were students with high levels and low levels of autonomy, equally, in both the technical and humanities specializations.
- Practice/ laboratory classes in online education support the increase of students' individual autonomy, as the students need to look for solutions to problems by themselves and to individually explore areas of practice and understand the phenomena (especially if they cannot physically experience them).
- Individual autonomy directly influences the well-being of students. Achieving educational goals by one's own strength increases the degree of self-confidence, self-esteem, satisfaction and mental comfort. Lack of individual autonomy has opposite effects in the learning process in online education, thus creating insecurity, anxiety and the need for support and collaboration.

Team work and collaboration

- The acquisition of practical skills in online education is influenced only partially by teamwork and collaboration with colleagues. The latter allow students to complement each other, to learn from each other, to provide explanations and express their acquired knowledge, to provide feedback for mutual synchronization of knowledge, to complement their efforts to complete projects. Teamwork and collaboration provide a way to compensate for the shortcomings of online practice courses, provided that students manifest their interest in the educational process.
- Also, teamwork and collaboration help students to learn practical skills that are complementary to the didactic purposes. They offer the opportunity for development of social skills, negotiation, responsibility, and motivation to meet project objectives.
- In particular, students with a lower degree of individual autonomy rely on teamwork and collaboration, as it also provides them with emotional and motivational support, which keeps them anchored in the educational process.

Inclination towards IT&C technology

- Technical students have a greater inclination towards IT&C tools than ones in humanities, helping them to pass adaptation to online education more easily. Humanities students needed extra effort to adapt, successfully overcoming the encountered challenges.
- All students confirm that they have discovered and explored multiple variants of alternative solutions to the physical practice context, which can meet the need to acquire practical skills in online education (where is the case), increasing their creativity and problem-solving ability.
- Students whose object of practice is IT&C had a greater freedom to manifest and explore practical skills.
- Lack of skills in management of IT&C tools is not an impediment for students to acquire practical skills in online education. Indeed, the management of IT&C tools is supports the

completion of online educational activities, but it is easily assimilated by the means of minimal adaptation efforts.

Instructor facilitation

- Instructors strive to facilitate the learning process in online education context, but are constrained by a number of limitations, which are mainly related to:
 - Their openness to the use of IT&C tools;
 - Their degree of adaptation (energetically, emotionally) from classical education to online education;
 - The degree of adaptation of methods, techniques and informational contents to the needs of online education;
 - The availability of appropriate teaching materials and tools, as well as their adaptation for the needs of online education;
 - The individual interest and openness given to the online educational process.
- The facilitation offered by the instructors contribute to the engagement, persistence, motivation and direction of the students in the learning process, as well as to the efficiency of the students facing challenges related to practice courses.

For the students' acquisition of practical skills, the instructor's contribution counts especially from the perspective of eloquence of materials and steps to be followed in practical tasks, elucidating the purpose, context and phenomenology of practical activities, in order to allow further individual exploration of students, at their own pace. The instructor outlines the overall directions, on the basis of which students can build autonomously afterwards.

Given the limitations brought by the lack of physical practice space, the facilitation and feedback of the instructor are perceived as essential to support the acquisition of practical skills or, at least, to understand the practical phenomena.

Student satisfaction

- Students have a low degree of satisfaction regarding the practice/ laboratory classes and the acquisition of practical skills in online education.
- In the situations dependent on the physical space of practice, the acquisition of practical skills is strongly flawed, being reduced to a simple understanding or anticipation of the studied phenomena. Students say they feel unprepared and fearful about how they will perform in the actual workplace.
- In practice situations that are based on informational content, students register a higher degree of confidence regarding the acquisition of practical skills. For example, technical students who focus on software programming (which does not imply noticeable differences between the physical and online practice contexts) have even noticed an improvement in the process of acquiring practical skills, due to the possibility of focusing their attention strictly to what is of interest for them, as well as to the free and autonomous exploration of contents.
- Additionally, students noted the existence of collateral benefits of online education, such as:
 - the acquisition of online/ remote working skills;

- an increase of skills and abilities in working with IT&C technologies;
 - an increase in available spare and working time (due to lack of physical trips);
 - the possibility to explore the didactic contents in the rhythm and according to one's own preferences;
 - the possibility of increased attendance at courses (especially if the workplace schedule would not have allowed them to reach all courses);
 - the ability to manage a large number and an increased diversity of didactic information sources;
 - an increase in capacity of adaptation to difficult life contexts (such as those imposed by the pandemic crisis);
 - an increase in the openness to leverage the individual creativity and problem-solving ability;
 - the acquisition of complementary practical skills, such as: individual organization, individual autonomy, coordination in teamwork, mutual support.
- The well-being of students in online education was higher than the one revealed in the previous study ([Popescu et al., 2021] conducted three months ahead). Adaptation of students to the online educational context helped them to better leverage the surrounding physical space and to enjoy the comfort of their own will and of the lack of physical trips.
 - The main aspects of online education that have been reported as negatively influencing the well-being of students are: lack of physical social interactions, sudden (abrupt) interruption of online social interactions, difficulty of concentration to online courses, monotonous nature of activities, speed of work (which weakened the quality of the natural flow of activities, giving them a character of routine tasks that only need to be checked), the lack of psychological anchoring in the educational context.
 - The physical space offers students a mental comfort, generating the feeling of protection/safety and lack of exposure to social interactions.

At the same time, long-term loneliness creates anxiety and depression, confusion, neglect and disengagement, increasing the need for support and mental support.
 - Online education brings advantages in terms of comfort and physical organization of students, but has disadvantages related to emotional balance and mental states.

Other aspects

- In this study, compared to the one focused on well-being ([Popescu et al., 2021] which was conducted three months ahead), there is a higher degree of adaptation of students to online education.

The theoretical learning process no longer presents obvious problems or unexpected evolutions (it entered a path of predictable evolution), but the process of acquiring practical skills remains problematic, especially in situations dependent on the physical space of practice, or on the physical/hardware tools and methods. Some of these cannot be replaced, hence making the physical presence of students in the classroom or in the laboratory, imperative.

- Students anticipate that, in the long run, both they and the instructors, as well as other categories of staff who contribute to the theoretical learning process, will adapt much better to online education, setting the path for adaptation of future educational systems.

Instead, practice/ laboratory activities imperatively require physical presence in the classroom and in the practice space.

- Of the students who also have a job, most responded that online education does not influence their learning at all, compared to the classical education. However, a few of them have confirmed that thanks to online education they manage to attend several courses (which, normally, they could not have reached due to the overlaps of the programs at college and at work).

- There was a difference in the nuances of students' responses, depending on their age: older students (that overpassed the age of 18-23 years old) are more focused on content and learning, are more autonomous, more engaged in activities, more positive, have an increased well-being and lower anxiety levels.

Younger students (in this case, those in the interval 18-23 years old) feel a greater pressure due to lack of physical social interaction, tend to be less autonomous and less engaged in the educational process, tend to be more confused and need more external support and coordination.

- There was a student with an obvious predominantly kinesthetic learning style, for whom the acquisition of practical skills seems to be strictly conditioned by the physical contact with tools and practice subjects. In the absence of physical practice context, the acquisition of practical skills (in his case) is perceived as severely affected, regardless of the compensatory nature of the alternative tools, methods and techniques offered by the instructor.

7. Discussions

- The hypothesis of previous research (focused on well-being [Popescu et al., 2021]), according to which the well-being of students is lower in the context of online education than in classical education is reconfirmed, but with small adjustments: students feel more adapted to online education, feeling an increase in the level of physical/ external comfort. At the same time, the need for social interaction is exacerbated, while the emotional well-being decreases.

- Online education is a disruptive factor that has forced actors in the educational process to adapt to unforeseen situations. If, at the beginning of the online education period (one year before the present researches), the changes in educational context increased the level of stress, now online education is capitalized both from the perspective of continuation of educational process, as well as from the perspective of the newly found specific benefits (which are not present in the classical education).

Students have identified positive and useful aspects in online education (e.g. exploring the diversity of software solutions and sources of information available on the Internet; deployment of video conferences for spontaneous meetings and for problem solving at group/ team level), which they want to keep on a long term, even in the situation of returning to classical education.

- The predisposition to introversion can be an advantage for both the learning process and the well-being, in online education. Some students reported that home context and the presence in front

of the monitor (during the video conferences) may be perceived as a psychological space of safety, protection and comfort, compared to the classical social interactions.

- Lack of ability to practice and exercise skills has a significant negative impact on the student with kinesthetic learning style. Instead, although the student in question has creativity and leverages it to compensate for the lack of physical space, by adapting tools, methods and techniques, the efficiency in acquiring practical skills seems to be very low in the end.

8. Conclusions

The hypothesis – according to which *the acquisition of practical skills in online education, compared to classical education, is more affected at the level of technical students than at the humanities ones* – was not confirmed. The acquisition of practical skills is dependent on variables present in both categories of profiles/ specializations, which are related to: practice tools, contextual nature of the practical activity, facilitation by the instructor and individual autonomy.

- Individual autonomy positively influences both well-being and the acquisition of practical skills.
- The acquisition of skills in the context of online education leads to the development of individual autonomy.
- The acquisition of practical skills is strongly affected/ limited when it is dependent on the physical context of practice (e.g. on equipment and systems in the case of technical students, or on human interaction in the case of humanities ones).

If it is independent of the physical context of practice (e.g. in the case of technical students who need only software programming environments, or in the case of humanities students who work only cognitively with practice subjects), the acquisition of practical skills receives almost no negative influence, while supporting even positive/ beneficial implications, due to a better organization of time, resources and activities, as well as to the students' capitalization of individual autonomy and creativity.

- No differences have been identified regarding the evolution of acquisition of practical skills in online education, depending on the undergraduate and master's degree cycles.
- Teamwork and collaboration do not significantly contribute to the acquisition of practical skills, but support the development of collateral skills (such as complementarity in work tasks, providing mutual support, taking responsibility, engaging in tasks/ objectives) and increase the level of well-being of students in online education.
- The inclination towards IT&C is a condition for conducting online practice classes, but after the students' adaptation and assimilation of necessary basic skills, they do not explicitly contribute to the acquisition of practical skills in specialized disciplines, nor for technical students, or for humanists.

The inclination towards IT&C is a condition unanimously fulfilled at the level of technical students and does not represent a variable that would influence the acquisition of practical skills in specialized disciplines. The acquisition of practical skills in the case of technical students requires much more than the only inclination towards IT&C, including in-depth knowledge and skills in the use of devices, systems and networks of technological equipment.

- Facilitation by the instructor has a major influence for stimulating, organizing and mobilizing students to embrace an individual path of exploration and understanding of the phenomena, as well as for acquisition of practical skills.
- The students' well-being in online education stands in a compromise between the physical adaptation and comfort, on one side, and psycho-emotional inconveniences, on the other.

9. Further perspectives

- The research may be continued with a study on students' adaptation to online education, as a consequence of a long-term exposure to these working conditions. It is also possible to identify the elements that bring an advantage to the learning process, as well as the ways in which students prefer to mix them with classical education tools, methods and techniques, in order to substantiate the transformation of the classical educational context in terms of modernity, utility, efficiency and large-scale blended learning.
- A more in-depth study related to the influence of online education on the learning process shall be focused on the students' learning styles variable, revealing the requirements for adaptation of educational contents and methods to the specific needs of students. The results of such a study may be useful from a psychological perspective, to support students in the process of self-knowledge and in calibration of their own efforts to the learning process.

Acknowledgements

I offer acknowledgements to Cosmina MIRONOV and Gheorghe CĂȚANĂ for their support in development of this study.

Annex - Questionnaire used in the interviews

1. How would you describe online courses?
2. How do laboratory / practice classes evolve in the online environment?
3. What advantages and disadvantages do you find in laboratory / practice classes in online education, compared to those held in class?
4. How did the laboratory / practice classes in the online environment help you to learn practical skills?
5. To what extent does individual autonomy help you to acquire practical skills in online education?
6. What importance do you think individual autonomy has, for your well-being, in the learning process in online education?
7. To what extent do you feel that the laboratory / practice courses in the online environment help you or condition you to develop your individual autonomy?
8. What is the importance of teamwork and collaboration, for the acquisition of practical skills, in online education?
9. What is the importance of teamwork and collaboration, for your well-being, in online education?
10. To what extent do you feel the need for collaboration and support, to meet the requirements of laboratory / practice classes, in online education?
11. How do you think the acquisition of practical skills, in terms of using alternative methods and tools, which make up for the lack of laboratory equipment or physical context, in online education is influenced?
12. How do you perceive the contribution and support coming from the instructor, in organizing laboratory / practice classes, in online education?
13. How important do you think the instructor's contribution is in the process of acquiring practical skills in online education?
14. Overall, how do you assess the acquisition of practical skills in online education?
15. How would you describe the overall well-being you feel in online education?
16. In what way is your learning process influenced by online education, given that you are also employed?

References:

- Co, M., Chung, P.H., Chu, K. (2021).** *Online teaching of basic surgical skills to medical students during the COVID-19 pandemic: a case-control study.* Surgery Today, DOI <https://doi.org/10.1007/s00595-021-02229-1>
- Dee, K.C. (2021).** *Making Space for Other Voices: Hands-On, Human-Centered Design Delivered Online.* Biological Engineering Education, Vol.1(1), p.11-17, DOI <https://doi.org/10.1007/s43683-020-00003-2>
- Destino, J.F., Gross, E.M., Niemeyer, E.D., Petrovic, S.C. (2021).** *Hands-on experiences for remotely taught analytical chemistry laboratories.* Analytical and Bioanalytical Chemistry, DOI <https://doi.org/10.1007/s00216-020-03142-1>
- Eom, S.B. & Ashill, N. (2016).** *The Determinants of Students' Perceived Learning Outcomes and Satisfaction in University Online Education: An Update.* Decision Sciences Journal of Innovative Education, Volume 14, Issue 2, <https://doi.org/10.1111/dsji.12097>
- Flynn, W.P., Kumar, N., Donovan, R., Jones, M., Vickerton, P. (2021).** *Delivering online alternatives to the anatomy laboratory: early experience during the COVID-19 pandemic,* Clinical Anatomy, DOI <https://doi.org/10.1002/ca.23722>
- Kukreja, V., Sakshi, Kaur, A., Aggarwal, A. (2021).** *What Factors Impact Online Education? A Factor Analysis Approach.* Journal of Engineering Education Transformations, Volume 34, p.365-374, DOI: 10.16920/jeet/2021/v34i0/157180
- Paudel, P. (2021).** *Online education: Benefits, challenges and strategies during and after COVID-19 in higher education.* International Journal on Studies in Education, 3(2), p.70-85, DOI: <https://doi.org/10.46328/ijonse.32>
- Piyatamrong, T., Derrick, J., Nyamapfene, A. (2021).** *Technology-Mediated Higher Education Provision during the COVID-19 Pandemic: A Qualitative Assessment of Engineering Student Experiences and Sentiments,* journal of Engineering Education Transformations, Vol. 34, p.290-297, DOI: 10.16920/jeet/2021/v34i0/157158
- Popescu, E.F., Tătucu, M., Dobromirescu, V. (2021).** *Students' Well-being in Online Education in Covid-19 Context.* International Journal of Education and Research, vol. 9 (2), <https://www.ijern.com/journal/2021/February-2021/01.pdf>
- Rice, L., Alquist, J.L., Penuliar, M., Donato, F.V., Price, M.M. (2021).** *Engaging Students in a Research Methods Writing Lab Online, Teaching of Psychology,* Vol. 48(1), p.18-25, <https://doi.org/10.1177/0098628320959954>
- Yang, Y. & Cornelius, L.F. (2004).** *Students' Perceptions towards the Quality of Online Education: A Qualitative Approach.* Association for Educational Communications and Technology, <https://eric.ed.gov/?id=ED485012>