

CORRELATIONS BETWEEN THE DENTAL MEDICINE STUDENTS' OPINIONS ABOUT ONLINE LEARNING AND THEIR MOTIVATIONAL PERSISTENCE SKILLS

Cristina Gena Dascălu¹, Magda Ecaterina Antohe^{2*}, Doriana Agop-Forna³, Norina Forna⁴

¹Medical Informatics Dept., Faculty of Medicine, "Grigore T. Popa" University of Medicine and Pharmacy, Iași, Romania, cristina.dascalu@umfiasi.ro

²Implantology and Prosthetic Implant Rehabilitation Dept., Faculty of Dental Medicine, "Grigore T. Popa" University of Medicine and Pharmacy, Iași, Romania, magda.antohe@umfiasi.ro

³Dento-alveolar and Maxillo-Facial Dept., Faculty of Dental Medicine, "Grigore T. Popa" University of Medicine and Pharmacy, Iași, Romania, doriana.forna@umfiasi.ro

⁴Implantology and Prosthetic Implant Rehabilitation Dept., Faculty of Dental Medicine, "Grigore T. Popa" University of Medicine and Pharmacy, Iași, Romania, norina.forna@umfiasi.ro

Corresponding author: Magda Ecaterina Antohe, magda.antohe@umfiasi.ro

Abstract

The online learning is a modern trend in universities around the world and will certainly become an important partner in all academic programs of the coming years. The students major challenge is to adapt to the requirements of the new teaching tools, changing their learning style and the expectations they have from the academic teaching programs, in order to be performant. Of great use in this approach is the temperamental structure of each individual and his ability to focus on achieving the proposed goals and to be consistent, which can only be identified and quantified through psychological evaluations. We conducted a study between 2020 and 2022, on a sample of 551 students, 23.8% males and 76.2% females, with an average age of 21.78 ± 3.736 years; we invited them to specify their opinion about the online education in which they participated during the pandemics and we correlated their answers with their psychological learner profile, evaluated using the Motivational Persistence Scale. The study confirms our working hypothesis, according to which the students with high scores on the Motivational Persistence Scale and a strong will to get involved in achieving long-term goals and fulfilling the current tasks, have also favorable opinions about the online learning, while the students who don't generally agree with the online learning, being highly aware by its disadvantages, are also less motivated and consistent in reaching the goals they set up.

Keywords - online learning; medical learning; electronic teaching tools; Motivational Persistence Scale.

I. INTRODUCTION

Online medical learning is a modern trend in universities around the world, and its advantages and disadvantages are highly discussed nowadays. Its potential and strengths were revealed especially in the last years, during the COVID-19 pandemics. The concept of "online education" is related to a large variety of tools and approaches, a few examples being distance-learning, flipped classroom, active learning [1] or microlearning [2] – all these approaches being developed with the purpose to facilitate the transition from static resources, with or without multimedia support, to dynamic, interactive environments.

One of the major advantages of online education is the significant improvement of the students' performances, revealed by many studies worldwide [3-6]; such studies, even if they were focused on purely medical subjects, concluded that the students' performances during online educational programs were at least equal, if not better, than those obtained with the classical methods. Another reported advantage is the greater access [7], correlated with significantly improved presence at courses, in the context where most universities around the world have to face nowadays with an important degree of absenteeism. The students find very convenient to participate at courses online and therefore their presence is improved [8]. Equally, the students' motivation

is improved, and the self-study is stimulated, because the students gain the opportunity to learn in their own pace, when and where it is the most comfortable for them, and they have unlimited access to the didactic material, to lecture them whenever they feel the need [9]. Other reported advantages as well are the resource scalability, cost-effectiveness, quick lesson delivery, instant up-skilling and traceable outcomes [7].

Among the weaknesses of online learning, also revealed by students, the most important one is the lack of human contact with the teacher, which can lead on long term to a hamper in developing communication skills (mandatory actually for the future physicians). The students also claimed difficulties in focusing the attention because the own house is not always the best environment for work and concentration; they need to have strong self-motivation strategies and time management skills in order to keep the pace [10]. The online sessions tend to be denser and more concentrated than the classical ones, without breaks and dead times, so it is quite difficult for the students to keep the same level of focus during the whole meeting. Another significant problem can be caused by the logistic support – it is mandatory for students to be computer literate [6], the quality of network connection can perturb the communication's fluency, and the students have to make additional expenses in order to purchase all the devices they need in order to attend the online programs – laptop, webcam, microphone, etc.

The utility of online learning in medical education is also highly documented [11-14]. Unfortunately, this particular field have to face with some undeniable difficulties. The general, and probably mostly true, opinion is that medicine can be taught only at the patient's bedside - at present there is no effective online solution to allow clinical practice on real patients. Case simulations and virtual patients can partially substitute the effective practice [15], but they are useful only to acquire basic skills, being not suitable for in-depth training.

Despite all these difficulties it is certain that online education will become an important partner in all academic programs of the coming

years and medical academic programs will definitely align with this trend. Medical and dental students will thus be forced to adapt to the requirements of the new teaching tools, changing their learning style and the expectations they have from the academic teaching programs, in order to be performant. Of great use in this approach is the temperamental structure of each individual and his ability to focus on achieving the proposed goals and to be consistent, which can only be identified and quantified through psychological evaluations.

In this regard, an useful tool is the Motivational Persistence Scale, proposed by Professor PhD Ticu Constantin, from "Al.I. Cuza" University from Iași – the Psychology Department [16]. This scale consists of 42 items and allows the quantification of the respondents' attitude towards setting long-term goals and their follow-up, planning and following up on current tasks, and recalling unachieved goals. The Motivational Persistence Scale is recommended to assess a person's predisposition to persist in tasks or long-term goals that involve ambition, consistency, systematic planning of current activities, focus on accomplishing daily tasks, and frequent updating of unachieved goals.

The purpose of the study we carried out was to investigate if and to what extent students' opinions about online education correlate with their native ability to be consistent in pursuing the goals they propose, on short or long term, evaluated through the scores calculated on the Motivational Persistence Scale. Our working hypothesis was that such correlations should be present, because medical or dental students must have such qualities, which are mandatory to them for finishing their studies successfully, (because the medical studies are known as being very difficult), and also for making career in this field, which requires a lot of work, empathy and perseverance, under conditions of stress and increased responsibility.

II. MATERIAL AND METHODS

A. Database

We conducted a study between 2020 and 2022, on a sample of 551 students, 23.8%

males and 76.2% females, with an average age of 21.78 ± 3.736 years; we invited them to specify their personal opinion about the online education in which they participated during the pandemics and we correlated their answers with their psychological learner profile, expressed through the Motivational Persistence Scale. Almost half of the students (47.5%)

come from Faculties of Dental Medicine, most of them (64.4%) from the “Grigore T. Popa” UMPH in Iasi, although we had a fairly consistent participation from UMPH Craiova and “Victor Babeş” UMPH from Timisoara; 63.7% of students are from the 1st and 2nd years of study (Table 1).

Table 1. The sample’s main demographic features

		n (%)
Year of study	1	228 (41.4)
	2	123 (22.3)
	3	44 (8.0)
	4	2 (0.4)
	5	44 (8.0)
	6	82 (14.9)
Specialty	resident physician	28 (5.1)
	Dental Medicine	262 (47.5)
	General Medicine	190 (34.5)
	Dental Technique	70 (12.7)
	Assistants in Prophylactics	1 (0.2)
	Orthodontics and Dental-Facial Orthopedics	28 (5.1)
University	”Grigore T. Popa” UMPH from Iași, Romania	356 (64.6)
	UMPh from Craiova, Romania	108 (19.6)
	”Victor Babeş” UMPH from Timișoara, Romania	80 (14.5)
	”Iuliu Hațieganu” UMPH from Cluj-Napoca, Romania	7 (1.3)
Total		551 (100.0)

B. Methods

The students were asked to answer anonymously at an online questionnaire made from 31 items – 17 items regarding possible advantages of online learning and 14 items regarding possible drawbacks of online learning (Appendix A), by specifying their agreement level with some statements, on a Likert scale with 5 values, on which 1 meant total disagreement and 5 total agreement.

In the next stage, the students were asked to fill also anonymously, also online, the Motivational Persistence Scale questionnaire, made up from 42 items which allow assessing someone’s predisposition to persist in long-term tasks or goals that involve ambition, consistency, systematic planning of current activities, to focus on performing daily tasks and to update, if necessary, the untouched goals. The students had to specify also their agreement level with some statements, on a

Likert scale with 5 values, on which 1 meant total disagreement and 5 total agreement. Their answers were centralized by calculating the global indicator of motivational persistence SPM (obtained by summing up the students’ responses to all 42 items), as well as three specific indicators, respectively the students’ attitude toward achieving the long-term goals (SLG), fulfilling the current tasks (SCT) and recalling the proposed untouched goals (SRG).

The statistical processing was carried out in SPSS 29.0, the results being reported descriptively and analytically. The answers at each item were characterized through frequency distributions and contingency tables. The numerical variables were characterized through descriptive statistics (average and standard deviation). The comparisons between samples were performed using the ANOVA or Kruskal-Wallis tests for quantitative data, according to the results of Shapiro-Wilks tests of normality. We considered the $p \leq 0.05$ value

as statistically significant (*) and the $p \leq 0.01$ value as highly significant (**). The participants' informed consent was obtained, and the study was approved by the Ethical Committee of "Grigore T. Popa" UMPH from Iași.

III. RESULTS AND DISCUSSIONS

The general behavior of the 4 analyzed scores regarding the motivational persistence are presented in Table 1. The global SPM score varies between $84 \div 210$, with a mean value of

133.99 ± 16.012 , which is an average result at the level of the whole sample of students. In the same regard, the SLG score belongs also to the category of average results, while the SCT and SRG scores belong to the category of low – to – average results. These facts show that the medical student have a rather strong level of motivational persistence and are good in establishing and reaching long-term goals, even if they are not very persistent in fulfilling the current tasks and recalling the untouched goals.

TABLE I. THE GENERAL BEHAVIOR OF THE 4 ANALYZED SCORES – DESCRIPTIVE STATISTICS

	Mean	SD	SEM	Min	Max	Median	Interpretation		
							Low values	Average values	High values
SPM score (Global Motivational Persistence)	133.99	16.012	0.682	84.0	210.0	133.0	42 ÷ 98	99 ÷ 154	155 ÷ 210
SLG score (Achieving Long-Term Goals)	44.85	7.361	0.314	19.0	60.0	45.0	14 ÷ 33	34 ÷ 51	52 ÷ 70
SCT score (Fulfilling Current Tasks)	54.39	9.136	0.389	29.0	90.0	54.0	21 ÷ 49	50 ÷ 77	78 ÷ 105
SRG score (Recalling Untouched Goals)	18.28	4.211	0.179	6.0	30.0	18.0	7 ÷ 16	17 ÷ 26	27 ÷ 35

We performed the comparative study of all 4 scores regarding the motivational persistence according to each one of the students' opinions, favorable and not favorable, about the online learning. The obtained results are further detailed.

The global SPM score has statistically significant variations between the students which agree the online learning compared to the others (Table II). The general trend is a proportional dependence: the SPM score values grow as long as the students' level of agreement with the enumerated advantages of the online learning is also growing, with only two exceptions: item 9: "*The online didactic activities are more comfortable because I don't need to go to the faculty*" and item 13 "*The teachers work more during online didactic activities than during classical ones*" – in these cases the differences between the SPM score

values are not statistically significant. The students which totally agree with the enumerated advantages of online learning tend also to have increased SPM scores, belonging to the category of high values – which means that they have strong levels of motivational persistence. The biggest values for SPM score were recorded for students who believe that the tasks they receive during online activities are clearer and easier to solve (item 15, 158.2 ± 25.7), the online didactic activities make them more productive as students (item 8, 152.2 ± 22.5), being more efficient (item 4, 151 ± 28.8), and even the online practical activities are useful (item 12, 152.5 ± 29.5).

A different phenomenon is recorded in the case of not favorable opinions about online learning: there are only two statistically significant differences between the students' SPM scores associated with their opinions, in

the particular case of items 7 (“*I don’t find a proper motivation*”) and 10 (“*Lack of direct communication and human interaction with teachers*”). The students who are not motivated by online learning tend to have reduced SPM scores (with an average of 132.9 ± 15.3), as well as those who are neutral in which concerns

the communication and human interaction with the teachers (131.3 ± 14.4). The lowest value of SPM score was recorded for the students who think that during online activities the teacher does not constantly control them (item 9, 130.5 ± 16.9) – table II.

TABLE II. THE SPM SCORE (GLOBAL MOTIVATIONAL PERSISTENCE) COMPARATIVE ANALYSIS

	Total disagreement	Partial disagreement	Neutral	Partial agreement	Total agreement	p-value
<i>Favorable opinions about online learning</i>						
Item 1	127.3 ± 12.2	130.7 ± 17.8	132.5 ± 13.9	135.3 ± 14.0	145.4 ± 23.3	< .001**
Item 2	130.5 ± 11.1	128.8 ± 15.3	131.7 ± 13.7	134.9 ± 14.2	141.7 ± 21.1	< .001**
Item 3	133.3 ± 11.1	126.5 ± 13.7	131.8 ± 13.8	135.8 ± 14.6	141.7 ± 21.9	< .001**
Item 4	130.2 ± 14.7	133.3 ± 13.4	135.6 ± 16.5	135.2 ± 16.4	151 ± 28.8	.008**
Item 5	130 ± 16.3	129 ± 15.1	131.9 ± 14.5	136.6 ± 14	141.1 ± 21.4	< .001**
Item 6	131.8 ± 15.3	132.5 ± 13.5	134.5 ± 15.4	136.9 ± 16.2	148 ± 28.4	.046*
Item 7	130.6 ± 15.8	133.7 ± 13.5	134.4 ± 16.1	136.3 ± 15.6	146.7 ± 24.1	.012*
Item 8	129.1 ± 15.9	133 ± 13.8	133.5 ± 13.2	137.4 ± 15.4	152.2 ± 22.5	< .001**
Item 9	129.5 ± 12.6	128.8 ± 15.2	133.2 ± 13.7	133.8 ± 14.5	135.5 ± 18.1	.200
Item 10	132.9 ± 13.5	127.8 ± 13.5	132.1 ± 14	133.5 ± 14.8	139.2 ± 19.4	< .001**
Item 11	131.3 ± 14	132.8 ± 13.6	131.8 ± 14.7	136.6 ± 16.1	141.3 ± 21.6	.003*
Item 12	133.2 ± 15.1	132.9 ± 14	133.1 ± 15	136.9 ± 14.6	152.5 ± 29.5	.042*
Item 13	134 ± 13.1	132 ± 16.7	133.7 ± 14.5	134 ± 14.4	143.5 ± 27.5	.599
Item 14	133.1 ± 19.2	132.1 ± 15	133.4 ± 14.1	137.1 ± 13	148.2 ± 25.5	.010*
Item 15	132.6 ± 14.6	131.4 ± 14.4	133.9 ± 15	134 ± 12.3	158.2 ± 25.7	< .001**
Item 16	133.7 ± 12.3	128.4 ± 17.6	132.4 ± 14	133.6 ± 14	142.1 ± 21.4	.003**
Item 17	129 ± 17.1	130.8 ± 14.8	130.8 ± 13.7	136.7 ± 12.6	144.9 ± 22.1	< .001**
<i>Not favorable opinions about online learning</i>						
Item 1	134.3 ± 17.9	133.6 ± 11.2	133.2 ± 14.9	133.4 ± 14.4	138.1 ± 6	.831
Item 2	134.2 ± 19.1	133.9 ± 15	134.7 ± 13.6	132.8 ± 13.3	133.5 ± 15.1	.915
Item 3	134.5 ± 19	134.7 ± 14.6	133.4 ± 13.5	131.7 ± 14	135.6 ± 12.1	.479
Item 4	134.9 ± 17.4	130.6 ± 12.7	135.1 ± 14.6	133.7 ± 14.6	136.5 ± 15.2	.185
Item 5	133.9 ± 17.1	133.5 ± 14.2	134.7 ± 14.9	132.6 ± 13.9	141.1 ± 11.2	.197
Item 6	134.1 ± 17.6	133.6 ± 13.3	133.3 ± 15.7	135.3 ± 12.2	137.9 ± 12.6	.833
Item 7	138.7 ± 18.4	133.3 ± 14.7	132 ± 14.6	131.6 ± 14.9	132.9 ± 15.3	.027*
Item 8	135.1 ± 19.2	133.8 ± 15.9	132.5 ± 13.2	133.4 ± 13.7	135.6 ± 14.3	.700
Item 9	135.6 ± 18.5	131.7 ± 15.5	134.1 ± 14.2	135.6 ± 13.1	130.5 ± 16.9	.343
Item 10	137.6 ± 22.5	134.6 ± 15.7	131.3 ± 14.4	131.3 ± 14.3	136 ± 13.4	.027*
Item 11	137.3 ± 20.3	131.5 ± 14.7	134.4 ± 14.1	132.2 ± 15.4	135 ± 13.8	.240
Item 12	134.4 ± 19.7	133.6 ± 15.1	133.1 ± 14.2	135.1 ± 14.4	134.1 ± 15.4	.844
Item 13	136.2 ± 19.3	132.4 ± 13.8	132.7 ± 13.8	134.4 ± 12.4	133.6 ± 17.2	.533
Item 14	137.2 ± 21.1	130.8 ± 15.9	132.9 ± 14.1	135 ± 15.8	133.5 ± 13.3	.360
*p<0.05 statistically significant; **p<0.01 highly statistically significant						

In which concerns the SLG score, which measures the students' capacity to set up and reach long-term goals, the results are slightly different (table III). We also recorded many statistically significant associations between the high values of this score and the favorable opinions about online learning, but, however, less than in the case of global SPM score. The general trend is again to have increased values of the SLG score in case of the students with favorable opinions about online learning, but we recorded also not significant results in certain situations. The students with increased values for the SLG score believe that the online didactic activities make them more productive (item 8, 52.2 ± 7) and that the tasks they receive are clearer and easier to solve (item 15, 50.9 ± 7.3). On the other hand, we did not record statistically significant differences between the SLG score values at students who think that the online didactic activities are better in communicating the essence of materials (item 6), make them to understand faster and easier the presented concept (item

7), are useful (items 11,12), the teachers work harder (item 13) and the students are asked to solve more homework and tasks (item 14) – comparatively with the students who do not agree with these claims.

We also recorded several statistically significant differences between the SLG score values at the students with not favorable opinions about the online learning compared to the others, but also in a positive sense, that is, students who do not agree with these statements have significantly higher values of the SLG score compared to the others. This is the case of items 4 (“*Limited access to the Internet*”), 7 (“*I don't find a proper motivation*”) and 14 (“*Limitations due to the particularities of some disciplines*”) – other relevant facts being not identified. The lowest values of SLG score were reported in the case of students who have limited access to Internet (item 4, 41.9 ± 6.6) and technical difficulties (item 2, 42.5 ± 7.8) which makes it difficult for them to participate at online didactic activities (table III).

TABLE III. THE SLG SCORE (ACHIEVING LONG-TERM GOALS) COMPARATIVE ANALYSIS

	Total disagreement	Partial disagreement	Neutral	Partial agreement	Total agreement	p-value
<i>Favorable opinions about online learning</i>						
Item 1	42 ± 6.7	42.8 ± 8.5	44.3 ± 7	46.1 ± 6.6	48.4 ± 7.8	< .001**
Item 2	43.4 ± 6.5	41.2 ± 7.7	43.7 ± 6.8	46 ± 6.5	48.3 ± 8.1	< .001**
Item 3	44.3 ± 4.8	41.7 ± 6	43.4 ± 7	46 ± 7.2	48.8 ± 7.7	< .001**
Item 4	43.3 ± 7.6	44.6 ± 6.8	45.9 ± 7.4	45.1 ± 7.2	48.9 ± 9.1	.003**
Item 5	44.5 ± 8.1	42.2 ± 7.8	44 ± 6.9	46.3 ± 7.1	47.2 ± 7.2	< .001**
Item 6	44.8 ± 7.9	43.8 ± 6.7	45.4 ± 7.3	45.7 ± 6.7	47.3 ± 9.5	.080
Item 7	44 ± 8	44.3 ± 7	45.2 ± 6.8	46.5 ± 7.8	47.5 ± 8.2	.058
Item 8	43 ± 7.8	44.4 ± 7	44.6 ± 6.3	46.1 ± 7.1	52.2 ± 7	< .001**
Item 9	42 ± 7.1	41.6 ± 7.8	44.4 ± 6.3	44.4 ± 7	46 ± 7.8	.003**
Item 10	45.6 ± 7.9	41.1 ± 7.1	44 ± 6.5	44.7 ± 7	47.4 ± 8.1	< .001**
Item 11	44.4 ± 7.3	44 ± 7.2	44.4 ± 7	45.6 ± 7.5	46.9 ± 8.1	.051
Item 12	44.9 ± 7.7	44.2 ± 6.9	45.1 ± 6.8	46.8 ± 6.5	46.5 ± 9.6	.419
Item 13	45 ± 7.4	44 ± 8.2	44.6 ± 6.9	45.7 ± 6.9	46.9 ± 8.1	.230
Item 14	44.6 ± 8.9	44.3 ± 7.7	44.8 ± 6.6	46.4 ± 6.4	47 ± 8	.385
Item 15	44.2 ± 8.1	44.1 ± 7.3	44.9 ± 7.2	45.6 ± 6	50.9 ± 7.3	< .001**
Item 16	44.5 ± 7.8	42.6 ± 8.1	44.5 ± 6.6	44.7 ± 6.8	47.5 ± 9	.011*
Item 17	42.7 ± 9.6	43.5 ± 6.7	43.5 ± 6.8	46 ± 6.3	49.3 ± 8.2	< .001**
<i>Not favorable opinions about online learning</i>						
Item 1	45.5 ± 7.9	45.1 ± 5.8	42.7 ± 6.6	42.3 ± 7.4	43.7 ± 5.6	.006**

Item 2	45.5 ± 7.9	44.8 ± 7.2	44.5 ± 6.6	44.7 ± 7.2	42.5 ± 7.8	.388
Item 3	45.8 ± 8.2	44.8 ± 6.9	43.6 ± 6.5	44.2 ± 7.3	45 ± 5.5	.096
Item 4	45.9 ± 7.7	43 ± 6.8	44.6 ± 5.6	43.3 ± 7.9	41.9 ± 6.6	.002**
Item 5	45.4 ± 7.7	43.7 ± 6.7	44.1 ± 6.7	43.8 ± 6.8	45.5 ± 5.7	.199
Item 6	45.6 ± 7.7	44.5 ± 6.6	43.3 ± 7.8	44.1 ± 5.1	43.4 ± 7.7	.118
Item 7	47 ± 7.4	45 ± 6.6	44.1 ± 7.1	43.1 ± 7.7	44.2 ± 7.4	< .001**
Item 8	46 ± 8.1	45 ± 7.1	43.6 ± 6.7	43.8 ± 6.7	45.4 ± 7.4	.037*
Item 9	46.3 ± 7.8	43.8 ± 6.8	44.4 ± 6.9	44.7 ± 7.3	43.7 ± 8.2	.025*
Item 10	46.3 ± 8.6	44.7 ± 7.3	44 ± 7.2	42.9 ± 6.9	46.4 ± 6.7	< .001**
Item 11	46.7 ± 8.2	44.3 ± 7.2	44.4 ± 6.5	43.9 ± 8	44.9 ± 6.8	.033*
Item 12	45.6 ± 8	44.7 ± 7.4	43.7 ± 7	45.4 ± 6.4	45.2 ± 7.7	.274
Item 13	46.3 ± 8.1	44.2 ± 6.6	44 ± 6.4	43.3 ± 5.9	45.5 ± 9.1	.004**
Item 14	46.4 ± 8.1	43 ± 7.5	44.3 ± 7	45.2 ± 6.7	44.9 ± 7.4	.039*

*p<0.05 statistically significant; **p<0.01 highly statistically significant

The SCT score is in its turn statistically significant associated with the majority of students' favorable opinions about online education, being obviously higher among students who agree with such statements compared to the others (table IV). Its highest values are found among students who think that the tasks received during online activities are clearer and easier to solve (item 15, 65.9 ± 13), the online practical activities are more useful to them than the classical ones (item 12, 65.2 ± 12.8), the online didactic activities make them be more productive (item 8, 63.5 ± 10.8), being therefore more efficient (item 4, 62.7 ± 12.9). Instead, no statistically significant differences are detected only between the values of this score in students who consider online activities more comfortable because they do not have to go to college (item 9) compared to others.

With regard to the unfavorable opinions about online education, we did not detect

statistically significant differences between the SCT score values at students who have such opinions compared to the others, with only one exception. This is the case of item 7: students who do not feel motivated by online education have much lower SCT scores compared to the others (52.2 ± 9.2 versus 57.0 ± 9.9). Generally speaking, students who have unfavorable opinions about online education tend to have lower values of the SCT score than the others, with 2 exceptions: item 1 („poor level of digital competencies”) and item 5 („missing of a computer with the required technical features”). Anyway, these both items highlight rather objective reasons for not agreeing with the online learning, which are not related to their temper and personal conceptions about life and work. The lowest values of SCT score were reported in the case of students who are not properly motivated by the online education (item 7, 52.2 ± 9.2), because they miss the teachers' control and constant monitoring (item 9, 52.1 ± 9.9) – table IV.

TABLE IV. THE SCT SCORE (FULFILLING CURRENT TASKS) COMPARATIVE ANALYSIS

	Total disagreement	Partial disagreement	Neutral	Partial agreement	Total agreement	p-value
<i>Favorable opinions about online learning</i>						
Item 1	50.9 ± 8.2	52.8 ± 9.6	53.8 ± 8.5	55 ± 8.9	59.4 ± 11.1	< .001**
Item 2	50.8 ± 9.7	53 ± 7.8	54.1 ± 8.3	53.7 ± 8.9	57.9 ± 11.1	.012*
Item 3	51.8 ± 8.8	51.2 ± 8.6	53.5 ± 8.1	55.6 ± 8.9	56.7 ± 11.8	.002**
Item 4	52.5 ± 8.4	54.3 ± 8	54.9 ± 9.6	55.3 ± 9.9	62.7 ± 12.9	.007**
Item 5	50.8 ± 8.9	52.3 ± 8	53.4 ± 8.6	55.8 ± 8.6	57.4 ± 11.4	< .001**

Item 6	53 ± 9.3	53.9 ± 7.8	54.6 ± 9.1	55.9 ± 9.5	61.4 ± 13	.028*
Item 7	52.5 ± 8.9	54.3 ± 8.1	54.5 ± 9.4	55.7 ± 9.7	61 ± 11	< .001**
Item 8	51 ± 9.2	54.5 ± 8	54.4 ± 8.2	55.9 ± 8.9	63.5 ± 10.8	< .001**
Item 9	53.8 ± 9.4	51.6 ± 9.5	54.7 ± 8.4	54.3 ± 8.3	54.8 ± 10	.433
Item 10	51.5 ± 9.1	52.7 ± 7.5	53.6 ± 8.5	54.1 ± 8.8	56.7 ± 10.5	.011*
Item 11	52.6 ± 9	54.2 ± 7.4	53.3 ± 8.8	55.9 ± 10.2	57.9 ± 10.4	.009**
Item 12	53.6 ± 9.2	54.4 ± 8.2	53.6 ± 7.9	55.3 ± 9.8	65.2 ± 12.8	.002**
Item 13	54.1 ± 8.7	54.1 ± 8.8	54.1 ± 8.6	53.7 ± 9.2	59.8 ± 12.8	.013*
Item 14	54.2 ± 10.6	53.6 ± 8.9	53.9 ± 8.3	56.1 ± 8.1	61 ± 12.7	.007**
Item 15	53.3 ± 8.5	53.2 ± 8.6	54.5 ± 8.8	54 ± 7.8	65.9 ± 13	< .001**
Item 16	54.7 ± 8.1	52 ± 9.7	53.5 ± 8.4	54.2 ± 8.5	58.3 ± 11	< .001**
Item 17	52.1 ± 9.4	53 ± 8.6	53.1 ± 8.1	55.2 ± 8.2	59.7 ± 11.7	< .001**
<i>Not favorable opinions about online learning</i>						
Item 1	54.3 ± 10	54 ± 7	55 ± 8.8	53.9 ± 8.8	58 ± 2.8	.573
Item 2	54.4 ± 10.8	54.7 ± 8	54.7 ± 8.6	53.1 ± 7.7	55.5 ± 7.9	.636
Item 3	54.2 ± 10.4	55.6 ± 8.4	54.8 ± 7.9	51.5 ± 8.4	55.3 ± 7.7	.057
Item 4	54.4 ± 9.8	52.9 ± 7	55.8 ± 9.6	55.6 ± 7.1	54.8 ± 11.3	.171
Item 5	54 ± 9.5	54.4 ± 8.5	55.7 ± 8.8	53.5 ± 8	60.2 ± 6.3	.084
Item 6	54.2 ± 9.9	54.7 ± 8.1	54.7 ± 8.9	53.9 ± 7.1	54.7 ± 5.2	.982
Item 7	57 ± 9.9	54.8 ± 8.3	53.7 ± 8.9	53.1 ± 8.4	52.2 ± 9.2	< .001**
Item 8	54.8 ± 10.2	54.8 ± 9.5	53.7 ± 8.1	54.5 ± 8.6	53.6 ± 8.1	.782
Item 9	54.8 ± 9.9	53.6 ± 9	54.8 ± 8.4	55.1 ± 8.5	52.1 ± 9.9	.389
Item 10	56.3 ± 11	54.9 ± 9.3	53.4 ± 8.4	53.8 ± 8.4	54.3 ± 9	.188
Item 11	56.2 ± 10.4	53 ± 9	55 ± 8.4	53.4 ± 8.4	54.1 ± 9.2	.051
Item 12	54.7 ± 10.1	55 ± 9	54.5 ± 8.6	53.8 ± 8.5	53.4 ± 9.4	.762
Item 13	55.4 ± 10.2	54.1 ± 8.6	53.5 ± 8.2	55.8 ± 6.8	52.9 ± 10.5	.193
Item 14	56 ± 10.2	54.8 ± 9.6	54 ± 8.4	54.7 ± 9.2	53.2 ± 8.5	.186
*p<0.05 statistically significant; **p<0.01 highly statistically significant						

The last indicator (SRG score) is also poorly associated with the students' favorable opinions about online learning and not at all with the unfavorable opinions (table V). Generally speaking, the students had lower values for this score, being also noticed that those who agree to online education behave better than the others. Statistically significant differences and obviously higher values of this score were found in students who are satisfied with the online activities attended so far (item 1) and think that such activities make them to understand faster and easier the concepts (item 7), they are asked to solve more homework and tasks (item 14), which are clearer and easier to solve (item 15), providing them digital competencies which will be useful in their future professional activities (item 17). The highest values of the SRG score were recorded

at the students who believe that the online didactic activities are more efficient than the classical ones, both theoretical (item 4, 21.2 ± 7) and practical (item 12, 21.3 ± 6), because they are asked to solve more homework and tasks (item 14, 21.7 ± 5.6), which are instead clearer and easier to solve (item 15, 22.1 ± 5.7).

We did not detect statistically significant differences between the SRG score values for students who have unfavorable opinions about online learning compared to the others, but slightly bigger discrepancies were found in the case of items 1 („poor level of digital competencies”), 4 („limited access to Internet”) and 6 („lack of the time necessary to understand and use adequately the digital tools and resources”) – the students with unfavorable opinions having higher SRG

scores than the others. The lowest SRG scores were recorded at the students who believe that the digital tools are rigid and not flexible (item 3, 17.6 ± 4.1) and miss the teachers' control and constant monitoring (item 9, 17.2 ± 4.7) – table V.

TABLE V. THE SRG SCORE (RECALLING UNTOUCHED GOALS) COMPARATIVE ANALYSIS

	Total disagreement	Partial disagreement	Neutral	Partial agreement	Total agreement	p-value
<i>Favorable opinions about online learning</i>						
Item 1	17.1 ± 3.2	18.3 ± 4.3	18 ± 3.9	18.1 ± 4.2	20.6 ± 5.2	.020*
Item 2	18.6 ± 3.8	17.8 ± 4.4	17.7 ± 3.5	18.7 ± 4	19 ± 5.5	.167
Item 3	19.8 ± 3.1	16.8 ± 3.9	18.2 ± 3.7	18.3 ± 4	19.5 ± 5.7	.041*
Item 4	17.7 ± 4.4	18.1 ± 3.6	18.5 ± 4.2	18.7 ± 4.2	21.2 ± 7	.233
Item 5	17.1 ± 4.4	17.9 ± 3.6	17.9 ± 3.8	18.6 ± 4.3	19.7 ± 5.2	.071
Item 6	17.6 ± 4.3	18.4 ± 3.8	18.2 ± 4	18.7 ± 4.3	20.9 ± 6.3	.051
Item 7	17.3 ± 4.2	18.6 ± 3.9	18.5 ± 4.1	18.1 ± 3.7	20.6 ± 6.2	.006**
Item 8	17.9 ± 4.6	18 ± 3.7	18.1 ± 3.6	18.9 ± 4.6	20.4 ± 5.8	.171
Item 9	18.1 ± 3.1	17.7 ± 3.2	18.2 ± 3.4	18.4 ± 4.4	18.3 ± 4.5	.942
Item 10	19.9 ± 3.8	17.3 ± 3.4	18.2 ± 3.9	18.1 ± 4.1	18.8 ± 4.9	.263
Item 11	17.6 ± 4.2	18 ± 4.1	18.3 ± 3.8	18.7 ± 4.2	19.2 ± 5.2	.113
Item 12	18.2 ± 4.3	18 ± 3.9	18 ± 3.9	19.4 ± 4.1	21.3 ± 6	.110
Item 13	18.5 ± 3.6	18 ± 4.3	18.3 ± 4.1	18.3 ± 4.2	18.7 ± 6.1	.882
Item 14	18.2 ± 4.8	17.7 ± 4	18.3 ± 3.9	18.5 ± 4.2	21.7 ± 5.6	.023*
Item 15	18.2 ± 4.4	18.1 ± 4.3	18.1 ± 3.7	18.1 ± 4.4	22.1 ± 5.7	.046*
Item 16	18.1 ± 2.9	17.8 ± 3.9	18 ± 3.8	18.2 ± 4.5	19.6 ± 4.9	.135
Item 17	17.6 ± 3.3	18 ± 4.3	17.7 ± 3.8	18.9 ± 4	19.4 ± 5.4	.024*
<i>Not favorable opinions about online learning</i>						
Item 1	18.2 ± 4.6	18 ± 3.2	18.4 ± 3.9	19.3 ± 4.2	21 ± 3.7	.251
Item 2	18.3 ± 4.7	18.1 ± 3.7	18.6 ± 4	18.3 ± 4.3	18 ± 3.9	.839
Item 3	18.4 ± 5	18.1 ± 3.6	18.2 ± 3.4	18.7 ± 4.4	17.6 ± 4.1	.964
Item 4	18.4 ± 4.5	17.8 ± 3.5	18.3 ± 3.9	18.3 ± 4.2	20.1 ± 2.5	.299
Item 5	18.1 ± 4.4	18.6 ± 3.9	18.1 ± 3.4	18.5 ± 4.3	19.7 ± 3.6	.316
Item 6	18.1 ± 4.3	18.1 ± 4	18.3 ± 4	19.9 ± 4	20.6 ± 4.4	.058
Item 7	18.8 ± 4.5	17.6 ± 4.4	18 ± 3.4	18.5 ± 4.2	18.5 ± 4.6	.275
Item 8	18.2 ± 4.7	17.9 ± 4	18.2 ± 3.6	18.6 ± 3.9	19.1 ± 4.9	.543
Item 9	18.3 ± 4.6	18 ± 4.3	18.4 ± 3.8	18.9 ± 3.5	17.2 ± 4.7	.379
Item 10	18.7 ± 5.1	18.6 ± 3.5	17.6 ± 4.3	18.3 ± 3.6	18.4 ± 4.3	.427
Item 11	18.4 ± 5	17.9 ± 4.1	18.3 ± 3.8	18.6 ± 4	18.6 ± 4.2	.608
Item 12	18 ± 5	18.1 ± 4	18.3 ± 3.7	19.2 ± 4.2	18.1 ± 3.9	.100
Item 13	18.3 ± 4.8	18.1 ± 3.9	18.2 ± 4.1	18.8 ± 3.7	18.2 ± 3.9	.818
Item 14	18.7 ± 5.1	17.4 ± 3.4	18.1 ± 3.9	18.3 ± 4.4	18.6 ± 4	.362
*p<0.05 statistically significant; **p<0.01 highly statistically significant						

Our results highlight therefore that there are clear differences between the students' motivational persistence scores caused by their

opinions toward online education; the general observed trend is that the students who agree the online education generally have higher

scores than the others, and the students who think that the online education has major disadvantages have lower scores than the others.

IV. CONCLUSIONS

The main results highlighted by our study are the following:

- The global SPM score (global motivational persistence) is statistically significant higher at the students which agree the online learning compared to the others, being poorly correlated with the students' opinions about the disadvantages of online learning;
- The SLG score (achieving long-term goals) tends also to be statistically significant higher at the students which agree the online learning compared to the others, even if it is less correlated than the SPM score; the students who do not agree with the disadvantages of online learning have statistically significant higher SLG scores compared to the others;
- The SCT score (fulfilling current tasks) is also statistically significant associated with most students' favorable opinions about online education, having a behavior similar to the global SPM score; there are no statistically significant differences between the SCT score values at students who have unfavorable opinions about online education compared to the others, with only one exception: the students who do not feel

motivated by online education have much lower SCT scores compared to the others;

- The SRG score is also poorly associated with the students' favorable opinions about online learning and not at all with the unfavorable opinions; the students have lower values for this score, even if those who agree to online education behave better than the others.

There are no doubts that online education will become the missing link for education improvement based on technological advances. In this regard, the students, as well as the teachers, will have to adapt to the requirements of the new academic environments, by changing their opinions and working styles. In this process the success will be acquired easier only by the students with strong motivational persistence and consistency, which have the ability to establish objective goals, on short or long term, and the strength to do everything they can for reaching them.

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Appendix A: Students' opinions about online learning - the questionnaire's structure:

Favorable opinions about online learning:

- | | |
|--------|--|
| Item 1 | I am satisfied with the online didactic activities I attended so far. |
| Item 2 | I like to learn using digital tool and resources. |
| Item 3 | I like to work autonomously. |
| Item 4 | The online didactic activities are more efficient than classical ones. |
| Item 5 | The online didactic activities focus on the quality of the transmitted materials. |
| Item 6 | The online didactic activities are better in communicating the essence of materials than the classical ones. |
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- Item 7 The online didactic activities make me understand faster and easier the presented concepts.
 - Item 8 The online didactic activities make me be more productive as a student.
 - Item 9 The online didactic activities are more comfortable because I don't need to go to the faculty.
 - Item 10 The online didactic activities are flexible because I can learn when I want to.
 - Item 11 The online lectures are more useful for me than the classical ones.
 - Item 12 The practical online activities (seminars, laboratories) are more useful for me than the classical ones.
 - Item 13 The teachers work more during online didactic activities than during classical ones.
 - Item 14 The students are asked to solve more homework and tasks during online didactic activities than during the classical ones.
 - Item 15 The tasks are clearer and easier to solve during online didactic activities than during classical ones.
 - Item 16 I have the option to customize the tasks to solve, according to my own learning pace.
 - Item 17 The digital competencies acquired through online learning will be useful in my future didactic and professional activities.

Not favorable opinions about online learning:

I don't like to participate in online didactic activities because of the following reasons:

- Item 1 The poor level of my digital competencies
- Item 2 Technical difficulties (platforms to install, browsers, accounts)
- Item 3 Rigid and not flexible tools
- Item 4 Limited access to the Internet
- Item 5 I don't have a computer with the required technical features
- Item 6 I don't have the time necessary to understand and use adequately the digital tools and resources
- Item 7 I don't find a proper motivation
- Item 8 I don't have the habit to learn using these technologies
- Item 9 Lack of teachers' control and constant monitoring of my activities
- Item 10 Lack of direct communication and human interaction with teachers
- Item 11 Lack of an efficient structure of the content taught by the teaching staff
- Item 12 Lack of focused and relevant feedback from teachers
- Item 13 Lack of a well-structured schedule for didactic activities
- Item 14 Limitations due to the particularities of some disciplines (in case of my study objects, the learning activities cannot be easily transferred to the online environment)

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