Driving Value Creation in the New Economy Following the COVID-19 Crisis. Data-mining Students' Satisfaction from Online Teaching in the Virtual Academic Climate

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Abstract: This study examines the advantages of online teaching from the perspective of students at eleven institutions of higher education, universities, and colleges in Israel. The study was conducted at the end of the second semester of their academic studies, after students had experienced "face to face" studies, and they were asked to reply freely to an open question on how they evaluate the benefits of transitioning to online teaching. Students were forced to cope with a new reality, where they were compelled to study in a digital classroom. The academic-social climate, lecturer-student relations, and the relations among the students themselves changed instantaneously, with no preparation by any of those involved. The research findings can illuminate the strengths of online teaching with a view to the future. Was the impact of teaching and learning during the coronavirus era a one-time event for the students or one from which it is possible to examine and embrace new ways of learning as they see them? Based on 1,937 fully completed surveys, a mixed methods research design was employed. Major themes were manually tagged, and an empirical model was developed. Structural Equation Modeling (SEM) was utilized to test the model's goodness-of-fit. Findings present a host of parameters that have a significant positive influence on students' positive perception of the transition to online teaching. This study is the first to thoroughly examine the advantages of switching to online teaching among a large group of students from several different academic institutions, and it presents both qualitative and empirical results. Ethical implications of the findings are discussed.

Keywords: Online teaching, COVID-19, Virtual academia, Students

1. Introduction

The COVID-19 pandemic, which broke out about a year ago, required educational institutions to reorganize their manner of teaching, in particular by transitioning to e-teaching, so that studies could continue in times of lockdown. This generated a need for adjustment, by both faculty and students, but many advantages are also evident. Several studies have discussed the benefits of e-teaching; however, this is the first comprehensive study to examine the benefits of e-teaching as perceived by 1,937 students from 11 educational institutions, both empirically and qualitatively.

Mukhtar and colleagues (2020) explored and analyzed the benefits of and reactions to e-learning. They sampled about 12 students and 12 instructors from the medical college and university of dental medicine in Lahore, Pakistan, qualitatively and during the COVID-19 pandemic. The main advantages raised emerged first among the instructors, who claimed that the lesson had become "easy to manage", as it is possible to control the audio and see and examine listening more comfortably, while the system helps by providing access to insecure students who can contact the instructor by using the "chat". Another important parameter that arose as a meaningful advantage is lecture recordings, which helped the students review the information, follow it easily, and of course take notes and improve their understanding more comfortably. Other results emerged from the study by Velichová, Orbánová and Kúbeková (2020) regarding the advantages of e-learning during the pandemic. They sampled some 2,824 participants by questionnaires, where the sample included students of business administration and hostelry and high school students in a range of disciplines. The main advantage indicated by their study was the significant change in the toolbox in the educational environment, where students and instructors were on one hand required to rapidly develop significant technological skills, but on the other they enjoyed advanced interactive search engines, real time collaborations, that contributed significantly to students' involvement in the lesson.

Kasai and colleagues (2021) presented additional evidence of the significant advantages of e-learning during the pandemic, by exploring some 42 medical students in a qualitative and quantitative study in order to estimate their weaknesses and strengths side by side with quantitative evaluation of the effect of e-learning (Kasai et al., 2021). The main advantages raised were that it is possible to easily determine and specify the students' learning goals and be flexible with them. In addition, medical students could devote more time to urgent cases, to their analysis, and to generating more precise records, while their organizational skills improved throughout their studies and particularly during the pandemic and e-learning. Khalid, Bashir and Amin (2020) also presented the advantages of the association between e-learning and autonomous learning and academic achievements as advantages that evolved during the pandemic and were credited to e-learning (Khalid, Bashir and Amin, 2020). In a study that sampled 2,948 students, basic analyses were used without building a model in order to conclude that there is a more significant positive association between use of e-learning and improvement in autonomous learning and high academic achievements, than when compared to conventional learning, namely, all the students sampled in the "e-learning" group were found to have a higher self-capacity for learning and higher academic achievements (Khalid, Bashir and Amin, 2020). The advantages of e-learning were also investigated in the period that preceded the COVID-19 era. For example, the quantitative study by Dumford and Miller (2018), which included data on 300,543 American students and adults, claimed that e-learning is capable of encouraging different types of involvement in class than traditional learning, and even of improving the student's quantitative thinking (Dumford and Miller, 2018). Thus, also Mbuva (2015), who presented the advantages of e-learning methods through the success of the faculty in meeting students' learning needs and improving students' critical thinking via technology. In addition, authors emphasized the containment and acceptance of e-learning for the academic present and the ability to rapidly adapt to technological learning, such that this type of learning is accepted positively by the students (Mbuva, 2015).

Zhang and Han (2012), who conducted a quantitative study in a medical university in China, indicated a significant improvement in students' language skills. They found that of the 40 students divided into trial and control groups in the pre-pandemic period, the group that studied language in a mixed online and traditional learning model reached better achievements than their peers who studied language traditionally. In addition, the former formed a better basis for developing their autonomous and shared learning. Cristescu and Iordache (2017) indicated the interactional advantages. In their qualitative study they surveyed some 302 people and claimed that the interaction among the students and between the students and the instructors improved, as did the relations between individuals in different social groups (Cristescu and Iordache, 2017).

An interesting perspective on the advantages of e-learning was presented in the qualitative study conducted by Greener (2010), which surveyed teachers in universities in the pre-pandemic period. This study focused on e-learning and showed that the learning environment is no longer controlled by the instructor and that there is little control, as well as that the learning environment is adapted to the student's needs in real time. The learning environment has changed from one determined by the teacher's outlook regarding the student's environmental needs, whereby the teacher conducts the lesson, to one determined by the student, who perceives the environment as a personal learning domain, creates professional adaptations, and changes it to one that is familiar and convenient for his personal development, within the options provided by technology and with no environmental disturbance.

The research literature relates to three generations of online teaching (Wadmany, 2017, 2018; Almog and Almog, 2020):
- **The first generation** was aimed at benefiting humanity on a global level: at elite universities and free of charge.
- **The second generation** was aimed mainly at achieving the goals of the academic institutions on a global level: as a means of recruiting students from around the world to programs on campus, contributing to the institution's reputation as a leading innovative school, and excelling in unique aspects of the school, as well as maintaining a global presence. E-teaching also serves as a channel for fundraising and for increasing revenues by granting study certificates, diplomas, and awarding degrees at a low price to a large number of students.
- **The third generation** of online teaching was aimed at achieving local goals of the academic institutions: improving teaching by means of pedagogical network models (such as the backward course design), teaching courses with a high demand such as large introductory courses, preparatory, and/or supplementation courses. These courses are open free of charge to students from all over the world

who do not need a diploma or a degree. There is also a possibility of studying for a fee and receiving a diploma.

- Are we in the fourth generation?

The COVID-19 pandemic generated a substantial change in academic teaching in Israel as around the world, by transitioning from "face to face" teaching to online teaching and learning. This transition involves breaching barriers and challenges encountered by the students as well as by the faculty, which require an immediate response. Students who registered for academic studies based on their familiarity with the traditional study experience received, unexpectedly, a completely different experience: an experience of digital "distance learning" where it is possible to keep the microphone and camera off and thus become unseen and unheard.

This study is the first to examine the advantages of online teaching from the perspective of students at a variety of academic institutions after experiencing an unexpected semester. These advantages are manifested in open access for learners through digital tools, learner-centered teaching, the potential for independent learning anytime and anyplace, and interaction between students (Salmon, 2019). The following is an inspection of the typical academic climate in "face to face" teaching versus online teaching.

1.1 The academic climate in face-to-face teaching

The academic climate is the area or environment in which learning takes place. Traditionally, the academic climate describes the atmosphere in the classroom. This atmosphere is a product of interrelations between the physical elements in the classroom and the interpersonal student-lecturer relations (Smith, Smith and de Lisi, 2001). Some define the climate as the product of interrelations between students' views and perceptions and the relationship among them (Moos, 1979). Anderson saw the climate as a product of interrelations among the learners on one hand and between the students and lecturer on the other (Anderson, 1970, 1979). The different definitions are associated with the dynamic nature of the academic climate and the sense of a vital and lively setting: "The classroom is anchored in space and time and comprises several autonomous components that purposefully maintain mutual relations with each other" (Smith, Smith and de Lisi, 2001, p. 7).

The academic climate is comprised of two dimensions:
1. **The contextual dimension** includes the physical space, which encompasses chairs, desks, study material, interpersonal interactions, as well as the administrative/ institutional element and the psychological element (Schubert, 1986).
2. **The teaching dimension** includes all the factors that affect the lecturer and students' performance.

Many studies have examined the classroom climate and its psychological components (Fraser, 1982, 1986, 1989; Fraser and Waldberg, 1991). These psychological components include the academic climate, which comprises aspects that concern mutual social relations within the academic environment. This aspect of the academic climate is called the "academic-social climate".

The academic-social climate has much significance for teaching and learning processes in all educational settings. This issue has been neglected to a large degree with regard to institutions of higher education (Hativa, 2002), where the value of research is greater than that of teaching (Iram, 1978). Occupation with the academic-social climate was neglected in academic teaching despite the changes that occurred in higher education around the world. The year 2020 marked a huge transformation in teaching and learning in general and in academic teaching in particular.

Measures of academic-social climate relate both to learning and teaching and to the classroom social climate in the students' department and organization (support for the student, involvement by the lecturer, operating his authority as a teacher, order and organization when teaching, varied teaching methods, creating a sense of connection between the learners, and goal orientation). Research (do Nascimento, Porto and Kwantes, 2018) indicates that students' perceptions of the academic-social climate might vary substantially. In institutions and departments with strong interpersonal interaction students appear to show higher evaluation of the teacher's involvement and support and less with regard to competition, order, and organization. In contrast, students at institutions and departments not characterized by strong interpersonal interaction evaluate academic aspects more strongly.

The social dimension of learning constitutes an inseparable part of the academic climate and has also been found to have considerable weight in one's academic success (Samdal et al., 1998; Katz and Aspden, 1999). Joint learning in a group setting inevitably creates mutual relations and a sense of cohesion (Hiltz, 1995). The social relations formed within a study group constitute an important part of learning, as social interaction affects the quality of the interaction in the overall learning process as well as learning outcomes (Anderson and Kanuka, 1997; Springer, Stanne and Donovan., 1999; Hammond, 1999). Social relations within the learning group may improve mutual relations among the group members and thus enhance the efficacy of academic collaboration (Henri, 1999). Good social relations make it possible to form an efficient learning discourse, successful conflict management, and increase the involvement of group members in the discourse (Anderson and Kanuka, 1997).

The social atmosphere within the learning group is formed gradually, as the group members become familiar with each other. Over time, social interactions and friendships are formed, and their intensity might dictate motivation to share information with group members (Haythornthwaite, 1997). In time, a sense of belonging to the group emerges and it too affects the student's degree of involvement, satisfaction, and success in the course (Haythornthwaite, 1997; Katz and Aspden, 1999; Gatfield, 1999). The sense of belonging to the group is a measure that affects the student's transition from the status of observer to that of participant. This belonging affects the performance of tasks and involvement in the course, and hence also success in the course (Haythornthwaite, 1997). In general, most studies note the significance of students' attitudes and feelings towards the social environment of their studies, which constitutes a meaningful predictor of their achievements (Fox, Luszk and Schmuck, 1966).

1.2 The academic-social climate in the online expanse

The academic-social climate in the online expanse is currently in its first stages of research in the context of academic instruction. One major study conducted in Israel centered on courses at Tel-Aviv University. Sherry-Steinberg (2000) examined how the social atmosphere was formed in two online university courses. The researcher sought to explore whether and to what degree an academic-social climate is formed independent of face-to-face encounters. The research results showed that students in an online course who participated in discussion groups developed a strong academic-social atmosphere over time. The discussion groups generated a type of "coffee shop atmosphere" and facilitated topical discussions.

Nachmias and colleagues investigated the effect of combining online courses with classroom teaching on the social atmosphere (Nachmias, Mioduser and Shemla, 2000). The research results show that use of online courses significantly affects the teaching and learning process, by increasing students' involvement and participation. Moreover, an online course supported by classroom teaching enhances the group's academic-social climate and its joint work.

Several studies examined the evolvement of the academic-social climate in online courses by the nature of discussion groups that develop in the virtual dimension. Some claim that the virtual discourse might pose barriers for students due to the lack of face-to-face interaction. The distance and the absence of nonverbal cues generate social inhibitions that prevent an open attitude to learning and to constructing new ideas (McLoughlin and Luca, 2000). Nevertheless, students are able to feel part of an online learning group. This feeling depends on the form of discussion and interaction between the participants, the course structure, the role of the facilitator, and the technical features of the media.

During technology-assisted courses students, as a learning community, undergo a learning experience that includes learning about how to work together from a distance and how to use the media to complete their assignment. It is important to form a sense of community among the students in order to enhance efficient use of online courses (Sherry-Steinberg, 2000). The sense of belonging and of comfort in the technology-assisted media forms a sense of "flow". This is typical of discussion groups among students who use web-based study activities as part of classroom studies. The study also found that a sense of comfort and flow was typical of groups that had been previously acquainted (Sherry-Steinberg, 2000). This helps advance study aims as it helps students form purposeful activity, with feedback and the sense of an achievable challenge.

Aside from the study group, which constitutes an important element in the development of the academic-social climate, the course lecturer in the online course may also constitute a key factor in encouraging the formation of this climate. The lecturer can determine the level of the discussion and its boundaries, while striving to advance the study process (Wolcott, 1995; Anderson and Kanuka, 1997). If the lecturer assumes the role of

"social host" this might increase the level of participation by providing feedback, presenting examples, and encouraging the participants to undergo a productive learning procedure (McLoughlin and Luca, 2000). A technology-assisted course that takes place concurrent with classroom encounters requires the lecturer to implement insights from the classroom dynamics, with specific attention to the students (Ohara et al., 2000). The course lecturer might, through proper leadership and management of the online course, form a suitable climate for joint work and for the emergence of an intellectual debate (Davie, 1989; Salmon, 2000; Collison et al., 2000).

1.3 The online environment and the act of teaching

Technological changes are formed, by nature, to serve human beings and meet their needs, however they often have the effect of changing society and people. Technological inventions are assimilated in the social order and become an inseparable part of the new social existence. The manner in which technology is assimilated is indicated by research focusing on the effects of new technology versus its predecessors. For instance, in the 1950s and 1960s, following the invention of television, its efficacy as a teaching medium was explored relative to traditional teaching methods. Similarly, in the 1970s and 1980s a large range of computer-assisted teaching methods were explored, in the 1980s and 1990s multimedia was the focus, and from the late 1990s until the present technology-assisted and distance learning methods are being explored comparatively in order to check their relative efficacy (Bernard et al., 2004).

In recent years the use of technology for purposes of teaching and learning at institutions of higher education around the world has gradually grown (Jones and O'Shea, 2004). A great deal of effort is invested in constructing an online environment, since technology is considered to offer flexible time, space, and learning pace (Inglis, Ling and Joosten, 2002). In addition, there are advantages that are identified with technology, such as the significant improvement in utilizing time for learning, reducing the learner's dependency on a physical learning site, expanding the study setting and information sources, cancelling the dependence on textbooks as the single source of knowledge, and constructing an active knowledge environment while enhancing the academic dialogue (Hiltz, 1998).

1.4 Information technologies for learning

Despite the many advantages, use of information technologies for learning has not yet proven itself unequivocally. For instance, a study conducted by Bernard and colleagues included a meta-analysis with data from 232 studies on distance learning from the years 1985-2002 (Bernard et al., 2004). The researchers compared distance learning to classroom learning on three dimensions: achievements, attitudes, and dropout rates. They found that in aspects of synchronous learning, classroom teaching resulted in better achievements, while in asynchronous learning, distance learning resulted in better achievements.

Lou and colleagues examined the use of computer technology in group learning versus individual learning (Lou, Abrami and D'Apollonia, 2001). The findings showed that computer-assisted learning in small groups is more efficient than learning with a computer alone. The researchers concluded that the efficacy of using a computer as a learning tool depends to a large extent on the learner's features. On this point a distinction was also made between students who prefer an independent learning environment and students who need a learning environment that includes human interaction. The former will have more success in individual distant learning; the latter will have more success in group learning (Diaz and Cartnal, 1999). Turney and colleagues examined the benefits of teaching by means of hybrid courses, as manifested in improved student achievements (Turney, 2009). The researchers found that assimilating use of computers might significantly improve students' achievements, but only if the learning goals are compatible with their assimilation in the study program. According to the researchers, hybrid courses let students revisit the study material and thus the student is accountable for his own learning, which is adapted to his learning pace. In addition, the computer gives the student feedback and guides the learning, enabling him to enhance his achievements. Nevertheless, this learning method, which combines technology with traditional teaching, is not suitable for everyone – quite a few students miss the "campus atmosphere" as well as the unmediated contact with their peers and with the lecturer (Keith, 1999).

In any case, it seems that information and communication technologies (ICT) lose their force when they lack proper facilitation. In such cases the technology-assisted course is perceived by students as a tool that enables convenience, communication, and management of the class activity (Meister, 2002; Kyavik et al., 2004), while they lack thorough understanding of the learning possibilities it contains. In addition, active participation in

discussion groups does not necessarily attest to expanded knowledge. Davies and Graff explored the relationship between participation in online debates and students' final grades in the course (Davies and Graff, 2005). The researchers found that active participation in the course website and in discussions does not necessarily lead to higher grades. Assimilation of technology might indeed constitute a stimulus for learning, but it requires a paradigmatic change that shifts the emphasis from teaching to learning (Rogers, 2000). Indeed, technology has influenced and is still deeply influencing the style of teaching and access to information (Connolly, Jones and O'Shea., 2005), but it cannot yet be said for certain that the technological changes and assimilation of technology-assisted courses in teaching lead to better learning outcomes.

The research indicates a high degree of dichotomy with regard to the efficacy of technologies in learning. Some see technologies as an efficient tool that improves instruction and learning outcomes (Pifarré, 2007; Salpeter, 1998; Wodecki, 2006; Wenglinsky, 1998). Then again, others claim that studies that support technology-assisted learning are unique to a certain context and hence are not generic and cannot be generalized (Healy, 1998). Yet others argue that technology does not improve learning and knowledge at all compared to the traditional non-technology assisted learning procedure (Wright, 2008).

1.5 Difficulties of learning and technology

One of the difficulties that emerges with regard to learning and technology relates to how learning is treated. Learning can be seen as a simple act of acquiring knowledge, a type of transition from absence to presence. Another more complex outlook sees learning as a process aimed not only at acquiring knowledge but also an activity that contributes to the development and enrichment of the individual (Vygotzky, 1978). This type of learning is perceived as a factor that helps widen one's horizons and enrich one's inner world (Renshaw, 1992). This is learning that opens a sociocultural dimension for the learner, above and beyond the concrete level of knowledge.

Grasping learning in a wide context emphasizes its social dimension. Some claim that the social dimension might disappear in technology-assisted courses that allegedly neglect this aspect of the learning procedure (Felix, 2005). This part of technology-assisted teaching has hardly been explored systematically and raises the question of the contribution of technology-assisted courses to learning in its wide meaning, as enriching, expanding, and enhancing the learner's inner world, including the social and sociocultural aspect.

As evident from the literature review, technological developments have created a revolution, and they are challenging the educational system in general and higher education in particular (Leung and Ivy, 2003). The new tools require rethinking the methodologies we use for academic teaching (Passig, 2003), particularly since the system of higher education is absorbing students for whom academic education has become more accessible than in the past (Offir et al., 2004). This change process requires examining the effectiveness of technologies in learning and teaching (Mioduser et al., 1999). The huge increase in the number of online courses at academic institutions in Israel since 1999 is ascribed mainly to a national strategic initiative by the Council for Higher Education and its executive arm, Meital, the inter-university center for e-learning. The Council for Higher Education's call for a new pedagogy to accompany the new technological tools, has mostly remained unanswered (Tel Aviv University, 2003).

Preliminary exploration of online academic courses in Israel indicates that technology has advanced rapidly, leaving pedagogy lagging behind. In higher education there is a shortage of methodologies, guidelines, and manners of evaluation related to constructing online courses anchored in well-based theories, objective principles, and research findings. Most online courses are built on the personal intuition or personal experience of the faculty or of the developers (Nachmias and Mioduser, 2001; Saba, 2001). Although conclusions were reached based on "local" evaluation studies, there is no database of rules based on the aggregated conclusions regarding the effectiveness of technology-assisted courses in higher education (Guri-Rosenblit, 2003; Naveh, Tubin and Pliskin., 2003; Shelma and Nachmias, 2004; Soffer et al., 2004). Also, there are only few studies on the evaluation of online courses, a fact stressing that technologies were embraced before pedagogical developments adapted to this change in tools (Nachmias et al., 1999; Nachmias and Segev, 2003).

This situation is evident not only in the "how" of online learning environments but rather also in the "what" – What do we want to teach our students in order to prepare them to be knowledgeable practitioners, each in their own field, and responsible 21st century citizens? Such questions were not addressed when developing study programs in general, and in particular when planning the process of embracing technology (Dyson, 1998).

The faults of online teaching in academia are based on the following principles, as evident from the research literature (Wadmany, 2017, 2018): A low percentage (about 7%) of learner's complete online courses, students are concerned that their communication skills and interpersonal relations will be harmed, online courses are unsuitable for students who do not have the skills of independent learners and for students with low motivation to learn. As stated, in 2020 both lecturers and students inadvertently found themselves in a new reality – a dramatic change. Initial examinations were held of students' attitudes to this change.

1.6 The effect of online teaching on the satisfaction of students in Israel

A survey at Tel Aviv University (Cohen, Barot, Hagit, and Ezra, 2020) examined students' attitude to the efficacy of online teaching. The survey was completed by 183 students from Tel Aviv University. The findings concern the facilitators of distance teaching and learning as well as the difficulties and inhibitors, from the perspective of the students. The findings indicate that online learning affords the students the flexibility to manage their time according to their personal needs, lets them carry out other daily tasks while learning, and also allows them to maintain a routine. In addition, the online teaching pattern grants them flexibility in the pace of learning as it is possible to listen to recordings of lectures whenever and wherever convenient. Moreover, learning at home has an advantage as students do not have to come to the campus, saving them significant time and financial costs. Finally, the transition to online teaching made it possible to continue the semester and prevented its cancellation, which might have been detrimental to their course of studies in particular and to their life in general. Notably, the option of recordings contributed to the quality of teaching during this time on several spheres; in addition to being an efficient tool for students to make up missed lessons, they also helped lecturers improve the quality of teaching, as for the first-time lecturers could observe how they conduct lessons in order to improve their practice (Crane, 2020).

This innovative study aims to address an acute global problem. Several studies have attempted to understand the effect of the academic system, for instance Mayo's qualitative study (Mayo, 2020). However, no comprehensive study has examined the phenomenon extensively, both empirically and qualitatively, in several institutions. The current study is the first to examine the advantages of online teaching from the perspective of students at eleven institutions of higher education in Israel, both universities and colleges. The study was conducted at the end of the second semester of their academic studies, after the students had experienced "face to face" studies, and they were asked to freely answer an open question on their evaluation of the advantages of transitioning to online teaching.

2. Methodology

2.1 Initial Sample

A survey was distributed online using Google Forms to students from eleven academic institutions. Respondents were asked to freely answer the open question: "What are the advantages following the transition to online learning? How is this manifested for you?" and a Likert-type closed-ended question (from 1- completely disagree, to 5- completely agree): "In my opinion the transition to online teaching improves my study capacity" (symbolized as *IMP* in the model).

The number of fully completed questionnaires collected was 1,937. The majority of the respondents were from Ariel University (923), Sami Shamoon College (405), and Tel-Hai College (145). Of all respondents, 53.1% were female and 46.9% male. Respondents' age range was 18-28 (74.3%), 29-52 (24.4 %), and 53-67 (1.3 %).

2.2 Analysis

A mixed methods research design was employed (Terrell, 2012). First, answers to the open-ended question were manually reviewed, identifying major themes. Each response was binary coded regarding belonging to any of the themes, i.e., 0 (does not belong) or 1 (belongs) (Eckhaus and Sheaffer, 2018). Correlations were placed in the model between the variables, as they all belong to the same question. Table 1 details the themes. Notably, the respondents did not address all the themes rather only several that seemed to them important, such that it is logical to have only several dozen tags for each category.

Table 1: Main themes

	Variable	Theme	N
Lesson recordings	T1	Possibility of making up missing studies when the lecture is recorded	689
	T2	Possibility of learning at a suitable pace for me when the lecture is recorded	95
Students learn better during lessons	T13	Description of classroom problems unrelated to teaching (temperature, disruptive students)	18
	T14	There is no noise in class	88
	T16	Better concentration on the lesson	64
	T17	It is much easier to see the lecturer	31
	T18	It is not necessary to copy from the board	10
	T19	More material is learned in a shorter time	21
	T20	Makes it easier to cope with caring for children	33
	T21	I feel more comfortable asking questions during the lesson	14
	T23	**Enables** independent learning	25
	T24	**Requires** developing independent learning capacity	32
The lecturer teaches better	T28	The material is conveyed better	46
	T29	The lecturer is more attentive to the students during the lesson	20
	T30	The lecturers are more available via e-mail	25

Next, Structural Equation Modeling (SEM) was employed to test the model's goodness-of-fit (Eckhaus, 2019; Levy and Eckhaus, 2020). Model fit was estimated using CFI, NFI, RMSEA, SRMR, and minimum discrepancy, divided by their degrees of freedom (CMIN / DF). Values that indicate good fit are CFI and NFI > .95, RMSEA values < 0.05 (Ivzori-Erel, Bar-Sela and Cohen), the ratio CMIN / DF < 2 (Ohara et al., 2017), and SRMR< .08 (do Nascimento, Porto and Kwantes, 2018).

SEM is considered a second generation data analysis technique (Bagozzi and Fornell, 1982), which follows first generation statistical tools such as regression. Regression shows the direct effect of one variable on the other, however showing an effect in isolation of other effects, concluding that such causation occurred would be misleading (Cook and Campbell, 1979). We therefore used SEM to develop a model that combines the effects, so that no effect is isolated.

3.   Results

First, we explored possible differences between the academic institutions regarding capacity for improvement in one's studies due to the move to the online environment (*IMP)*. An ANOVA test was performed, showing a significant statistical difference (F(11,1884)=6.70, p<.001). A statistically significant difference was found between the Orot Israel College and the three major institutions investigated - Ariel University (p<.05), Sami Shamoon College (p<.001), and Tel-Hai College (p<.001). Means and standard deviations of *IMP* in the four institutions are presented in Table 2. Between the three major institutions investigated there was no significant statistical difference.

Table 2: N, Means, and SD of the four institutions regarding IMP

	N	Mean	SD	Kruskal-Wallis mean rank
Orot Israel	77	3.56	1.31	1244.83
Ariel University	923	2.73	1.53	952.19
Sami Shamoon College	405	2.5	1.52	871.02
Tel-Hai College	145	2.21	1.30	772.73

In Table 2 we observe that Orot Israel has the highest mean of improvement perception (*IMP*). However, since the Levene test of homogeneity of variances was significant, an a-parametric test was needed. We therefore performed a Kruskal-Wallis test, which confirmed a significant statistical difference (χ^2(11) = 71.96, p<.001). Kruskal-Wallis mean ranks are presented in Table 2. In Table 2 we observe that Orot Israel has the highest mean rank, compared to the other three.

Next, we investigated IMP differences among disciplines. Students' disciplines were distributed over a wide range; however, five disciplines were dominant: Social Sciences and Humanities, Computer Science, Education, Accounting and Economics, and Electrical Engineering. An ANOVA test was performed, showing a significant

statistical difference between these disciplines (F(4,630)=3.47, p<.01). Means and standard deviations of *IMP* in the four institutions are presented in Table 3. Results show a significant difference between Education and Social Sciences and Humanities (p<.05), and between Education and Computer Science (p<.05). In Table 3 we observe that the Education discipline has the highest perceived improvement in learning due to the move to an online environment (*IMP*).

Table 3: N, Means, and SD of the dominant disciplines with regard to *IMP*

	N	Mean	SD
Electrical Engineering	175	2.65	1.56
Education	125	3.06	1.51
Accounting and Economics	92	2.55	1.49
Social Sciences and Humanities	115	2.45	1.45
Computer Science	128	2.45	1.56

In the next step, we present the correlations matrix, followed by the development of the model and the SEM results.

Spearman's correlations, means, and SD are presented in Table 3. Figure 1 illustrates the model and results.

Table 4: Correlation matrix: Means, SD

	T1	T2	T13	T14	T16	T17	T18	T19
T1	-							
T2	.12***	-						
T13	.01	.003	-					
T14	.074***	.008	.211***	-				
T16	.030	.012	.042	.306***	-			
T17	.050*	.028	.116***	.269***	.161***	-		
T18	.051*	-.016	.068**	.088***	.188***	.106***	-	
T19	.015	-.001	-.010	.193***	.036	-.013	062**	-
T20	.001	-.030	-.013	-.010	-.002	.015	.046*	-.014
T21	.012	-.019	-.008	.069**	.052*	.038	-.006	.050*
T23	-.057*	.016	-.011	.019	.030	-.015	-.008	-.012
T24	-.080***	-.029	-.013	-.028	-.024	-.017	.047*	-.014
T28	-.025	-.012	-.015	.031	.009	-.020	-.011	.049*
T29	-.002	0	-.01	.002	-.02	.03	-.01	-.01
T30	.019	-.005	-.011	.019	.056*	.095***	.056*	-.012
Gender	-.028	-.036	.017	-.011	.006	-.021	.033	-.028
IMP	.19***	.14***	.09***	.16***	.2***	.08***	.08***	.09
Mean	.36	.05	.01	.05	.03	.02	.01	.01
SD	.480	.216	.096	.208	.179	.126	.072	.104

*p<.05, **p<.01, ***p<.001

Table 4: Cont.

	T20	T21	T23	T24	T28	T29	T30	Gender	IMP
T21	.083***	-							
T23	-.015	-.010	-						
T24	.014	-.011	.021	-					
T28	-.021	-.013	.012	-.020	-				
T29	.03	.11***	-.01	-.01	.02	-			
T30	-.015	-.010	-.013	-.0.15	.102***	.35***	-		
Gender	-.052*	-.044	.012	.024	-.024	*.02	-.052*	-	
IMP	.06**	.07**	.06**	.05*	.09***	.07**	.1***	-.09***	-
Mean	.02	.01	.01	.02	.02	.01	.01	.47	2.7
SD	.129	.085	.113	.127	.152	.1	.113	.499	1.51

∗∗p < .01. ∗∗∗p < .001. ǂp=.05   ---- dotted line implies mediation.
Note: T29 is exactly on the cusp of significance, however, since it is part of the same content world it is logical to consider it significant.
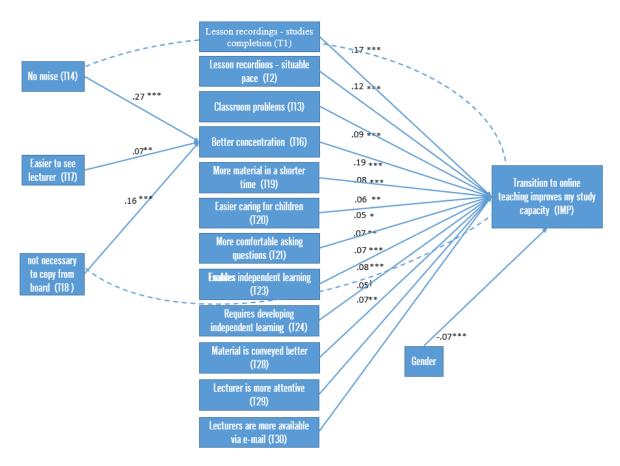
Figure 1: Model and standardized coefficients

The hypothesized model showed a very good fit: CMIN/DF = 1.95, CFI = .99, NFI= .98, RMSEA = .02, SRMR=.01. All the theme variables except T14, T17, and T18, had a direct positive effect on *IMP* – the perception that the move to online teaching improved personal study capacity. However, we found that the three variables positively affected T16, and that T14 and T18 had an indirect effect on *IMP* mediated by T16, as follows:

T16 mediation of the indirect effect of T14 on *IMP* was significant (β=.05, *p*<.001). Bootstrapped Confidence Interval (CI) ranged from [.03, .07]. T16 mediation of the indirect effect of T18 on *IMP* was significant (β=.03, *p*<.01). Bootstrapped Confidence Interval (CI) ranged from [.03, .07]. Bootstrap size for both mediations was 5000.

Finally, gender had a negative effect on *IMP* (β=-.07, *p*<.001). Since gender was coded as 0=female and 1=male, a negative effect implies that females had a more positive attitude to online learning than males.

4. Discussion

This study examines students' evaluation of the advantages of moving to online teaching. Students were "forced" to accept a new reality of learning in a "digital study environment". The academic-social climate, the conduct of lecturer-student relations, and relations among the students changed instantaneously, with no preparation by any of those involved. Hence, the research findings can illuminate the strengths of online teaching, with a view of the future. Was the effect of teaching and learning in the COVID reality a one-time event for students or one that can form a perspective for examining and embracing new manners of study for them? Teaching and learning – where are they headed?

The findings show that all of the investigated parameters have a positive and significant effect on students' positive perception of the transition to online teaching. Of these, the study found that use of lecture recordings was addressed the most, as a substantial advantage of online teaching in students' perception, and students grasp recordings as enhancing their academic capacity. Hence, with regard to the benefit of improved teaching for students, the current research findings urge lecturers to consider recording their lectures. This topic is not a

simple one and it involves challenges that have not yet been clearly resolved, for instance how to maintain rights to material when it is easily recorded, copied, and distributed, infringing on the copyright and harming the lecturer's livelihood. There is room to investigate this topic and to suggest viable solutions that will enable lecturers to record lectures with no concern and to grant students this important tool to improve their studies.

This finding of the current study constitutes a significant contribution to one well-known problem of the younger generation – lack of concentration, and suggests that online teaching might improve concentration, a topic stressed by the current research results. According to the results, reducing classroom noise, the ability to clearly see the lecturer, and eliminating the need to copy from the board, improve students' concentration during lessons. These improvements lead to higher satisfaction with online teaching, and the higher concentration they generate significantly enhances satisfaction with online teaching. Moreover, improved concentration mediates between reducing classroom noise and eliminating the need to copy from the board, and higher satisfaction with online teaching, namely, enhancing concentration is the reason that reducing noise and eliminating the need to copy from the board improve students' satisfaction with teaching.

The importance of these variables is highlighted through the mediation analysis. Mediation analysis is more than a statistical approach, but rather a highly complex and integrated methodology composed of research, conceptual, and analytic components (Walters and Mandracchia, 2017). Mediation analysis is becoming increasingly popular in psychological research (Li, 2019). This analysis is more informative than simple multivariate regression since it allows considering an additional type of variable, a mediator, which can help determine how an independent variable influences the dependent variable (Dondé et al., 2019).

While we have successfully presented key advantages of the move to the online teaching medium based on a large sample of respondent from different institutions, the respondents are all from the same country. Future studies may extend this research by investigating the findings in other cultures.

Another interesting finding is the difference between the Orot Israel College, which is an education college, and the three major academic institutions investigated - Ariel University, Sami Shamoon College, and Tel-Hai College, which are academic institutions. These results are further supported by the findings showing that education practice has the highest learning improvement perception due to the move to the online environment. This indicates a change in the pedagogic outlook, resulting from the COVID era. The fact that it is precisely in the field of education that the transition to the online medium is perceived as more efficient constitutes a issue for consideration regarding changes in pedagogic policy in the near future as well as an area for future research.

A supportive academic-social climate, while harnessing technology to the needs of teaching in order to benefit students, might make the learning experience more comfortable and convenient. It is necessary to recognize the fact that the new technologies created a paradigmatic change, and therefore new technologies that are uniquely adapted to the new educational technologies should be actively discovered and assimilated. In order to improve lecturers' performance as teachers, the pedagogical aspects of the new technological tools should be enhanced. A program that assimilates the new tools should be offered as an inseparable part of teaching practice rather than as an external aide for the teaching and learning process. The authors of the current article are of the opinion that computers will never replace teachers; nevertheless, lecturers with good command of the pedagogical aspects of computers and who harness them to improve the quality of teaching and learning – will replace those who do not do so.

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Appendix

Qualitative examples

The following are the major themes, with examples of each theme.

The themes are numbered T1 to T30, but the numbers are not continuous since during the manual classification process of such a large number of respondents, themes are often dropped or changed.

1. Recorded lessons

1. Possibility of making up missing studies when the lecture is recorded T1
"Recorded lessons can be watched again"
"The lessons are recorded and it is always possible to review the material when there is a discrepancy or when I did not concentrate or was not present during the lecture"

2. Possibility of learning at a suitable pace for me when the lecture is recorded T2
"The lecturers speak slowly, I see recordings at double speed"
"It is possible to follow recorded lectures, to stop when necessary in order to understand the materia, and then continue".
"When there are lessons where I wish to review the material studied at my own pace, it is possible to review the lesson several times and that's good"
"The option of recorded lectures and exercises also makes it possible for each student to learn at his own pace of understanding".

2. Students learn better during lessons

1. Description of classroom problems unrelated to teaching (temperature, disruptive students) T13
"The ability to combine work and studies because the lectures are available all the time, and there are no distractions as in class such as latecomers, noise"
"The advantage is the quiet, meaning that it is possible to concentrate better without the background noise of the class, and also to finally see the board well – in class it is often very hard to find a seat first and this makes it hard to understand the material and to study in general"
"Spares having to come to the university (significant), learning in crowded classrooms, there is no need to find a place in the first row (otherwise I don't see all parts of the board")
"There are no distractions by other students in the class, it is not too hot or too cold and there is no backache (as I get from the university chairs)"

2. There is no noise in class T14
"There is no noise and surroundings that can compromise concentration"
"You can hear the lecturer well and you can see the 'board' well, there is no noise made by other students, and in general it is more pleasant to study in this way for someone like me who prefers quiet"
"There is no noise like in class and there are much less comments and questions"
"A second advantage is that the lecturer can silence all the students. Usually students make lots of noise during lessons in a regular classroom but on Zoom it is possible to silence everyone and that helps me listen significantly better"

3. Better concentration on the lesson T16
"It is easier for me and I manage to stay much more concentrated than in class"
"It lets me learn much better and more thoroughly at hours when I am free, concentrate better, and maintain the pace"
"I manage to concentrate better because there is no noise around me and I concentrate only on what the lecturer is saying without background noise"
"It feels like sitting in the first row so the ability to concentrate increases, there is no need to make an effort to come to the university, classes do not drag out beyond the necessary time"

4. It is much easier to see the lecturer T17
"The knowledge that it is only me versus the lecturer without other people around me"

"Everyone can see and hear on the same level, not like in frontal when some people sit in front and others in back"

"I suffer from an attention disorder. And when I hear a lecturer via headphones on a screen with no class, the amount of disruptions is drastically reduced and I concentrate better"

"You can see any lecturer you wish with no place restrictions"

"The convenience of not having to find a seat in class, to sit far, to hear people talking"

5. It is not necessary to copy from the board T18

"It lets me listen better to the lesson and not be busy taking notes, and the notes are better"

"Online learning provides many files that lecturers wouldn't have provided if it was a classroom with a board, and this makes learning much easier"

"The possibility of reviewing lessons and taking notes even after the class is over (from recordings). Saves time – you don't copy from the board so the lesson is more concise"

"It is not necessary to copy the material that the lecturer conveys in the lecture and this saves much time during the lecture (another advantage for me specifically is that it is easier for me to absorb the material studied this way)"

6. You learn more material in less time T19

"More material is learned"

"The lecturer manages time more efficiently"

"You get more done"

"The lecturers do it as clear and lucid as possible and this forms a meaningful learning continuity as well as getting a lot done"

7. Makes it easier to care for children T20

"You can record and watch later (certainly for parents, who can time it better with feeding children and putting them to sleep)"

"I had just given birth and I could both be with the baby and care for him comfortably"

"In case you miss something, especially in circumstances when parents are caring for their children. Students are occupied with things that are no less important, communication problems, etc. It is possible to easily make up missed studies and not lag behind. It's wonderful when the material is saved and accessible! Because even if I missed something during the lesson itself it is always possible to review it"

"Availability for the children"

8. I feel more comfortable asking questions during the lesson T21

"There is room for more individual expression versus the lecturer – I can express myself much more and in such a way that the lecturer is responsive"

"The possibility of talking to the lecturer takes an organized form. Each [student] speaks in turn, not like in class where everyone talks at once"

"The questions are matter-of-fact only"

"I ask what I want to, not like in class where I'm embarrassed"

"The possibility of being more involved in class, asking questions"

9. Enables independent learning T23

"The convenience of self-study (that does not suit everyone)"

"People who can study from afar or learn at home on their own"

"More time for self-study, more convenient time planning"

"As a student of electrical engineering to begin with, even in a regular semester, lots of the learning is autonomous since there is a limit to how much a lecturer can impart understanding and deep insights of the material in a frontal lecture, so not having to come to class gives me more time for self-study and rest"

10. Requires developing independent learning capacity T24

"Requires more effort by the students. This is manifested in the self-study required in order to understand the study material"

"The online learning compelled me to develop my computer and programming skills and self-study, which I will need in my professional life after university studies"

"The advantages are thorough experience with independent studying"
"Requires much more self-discipline"

3.   The lecturer teaches better

1.   The material is conveyed better T28
"The assignments are more creative"
"Some courses are given excellently online and it is not necessary to hold them in a physical form"
"It is easier to understand the material"
"Learning with another lecturer for whom you did not sign up but who conveys the material better"
"More focused"

2.   The lecturer is more attentive to the students during the lesson T29
"I can express myself much more and in such a way that the lecturer is responsive"
"In workshops where the lecturer wants to know how each student has advanced there is no need to come to Ariel for that purpose"
"Lecturers are more considerate and explain each topic at more length"
"More consideration by the lecturers"

3.   The lecturers are more available via e-mail T30
"Lecturers are willing to be available after class as well"
"A response and individual attention"
"I notice that the lecturers are available and answer different questions during class and at other times, more than in frontal lessons"
"Lecturers with high availability"