

# Factors Affecting Computer Science Student's Academic Performance During Covid-19

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**Abstract :** In this research, the factors that affect the computer science student's academic performance are investigated in the scenario of online learning induced by the COVID-19 pandemic. It is found that while staying at home, and getting tutored online, the academic achievement of the students of Computer Science gets affected by the following group of factors: Family characteristics (family causal factors), Student's academic characteristics, Social and personal characteristics, Psychological and Health Related Factors, Institutional characteristics, Teachers (academic causal factors), Perceptions about Online Learning, Perception about Computers. As opposed to the general usage of only the CGPA as a measure of the academic performance, this research introduces the online self-study time (OSST) as well, as a measure of the academic performance. A total of 170 students had responded to a questionnaire administered to them to assess the effects of the identified factors. The questionnaire was checked for reliability and validity as well, using construct reliability, indicator reliability, convergent validity,

and discriminant validity. The students were from various semesters of Bachelor of Computer Science degree program. The questionnaire data is subjected to the multinomial logistic regression analysis. Results have shown that there is relation that exists between the identified factors and the academic performance of the students that is reflected in their CGPA and the OSST.

**Keywords :** COVID-19, Academic performance, Online learning, Online Self-study Time (OSST).

## 1. Introduction

Students are an output of the institution that we call educational premises; without the students, these educational premises – virtual or real – don't have any value. It is very important to make policies that benefit the students the most, because even the country's social and economic development is openly connected with student's practical and academic performance. Countries such as Japan and Germany are coping with the aging population; their educational institutions are hosting international students more and more (Hashimoto, 2020). Moreover, these countries are in dire need of immigrant workforce that can run their country because of the lack of number of youngsters. In such circumstances, it is even more important to highlight how important it is to focus on students' academic performance in general and Pakistani student's

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academic performance in particular because it is one of the countries with the largest number of people under the age of 25 (Kundi, 2018). Investing in their academic performance now can benefit this country in the future. The academic achievement of students plays a crucial role in generating the best superior quality graduates (Ali et.al, 2009). It is important to measure the student academic performance especially in these times when most students are working from home and are getting affected by psychological, social, environmental, economic, and personal factors. Job losses in Pakistan are forcing many students to get out and do some job. This is leaving them less time to focus on their education and even online learning facility is not benefiting them in the way as it should.

However, students in the times of COVID-19 are less reliant on teachers, and more on autonomous learning; many researchers are now focusing on the concepts such as self-regulated learning (SRL), in which students are vigorous and conscientious of their own education process as well as being erudite, self-aware and be able to select their own approach to learning (Viberg, 2020). Researchers have noted that students with strongly developed SRL skills are most effective in physical and online learning. However, not many students are well conversant with self-regulated learning (SRL). Thus they have to be checked how individual learning process is affecting their academic performance. Some standards to evaluate or assist in self-evaluation of students have become most important in the COVID-19 situation in order to guarantee good academic performance.

One has to note how COVID-19 is changing the teaching learning process. Whereas the literature has shown that the students are now spending <1 h/day to 12 h/day on their education, it also shows that there is dramatic increase in the cheating culture globally. Mostly the teaching is done by live streaming, however students can access the online materials as well, at any time of the day. Zoom is the most preferred tool for online teaching, followed by WhatsApp, and Google classroom while Edmodo, Microsoft Teams, Skype, and GMeet were sort of used in online learning. However, the assessment process is getting done without many checks.

Normally, most of the researcher around the world uses the CGPA to measure the students' performance (Stephen & Schaban, 2002; Darling, 2005; Galihir, 2006; Broh, 2000). Some other researcher measure

students' performance through the grades achieved in a particular subjects or the previous year results (Hijazi & Naqvi, 2006). However, since the students are sitting in the comfort of their homes and the final exams are normally conducted in the form of grand quizzes performed at home, cheating has become normal. Therefore, CGPA or GPA and the marks on an exam are not enough to gauge the academic performance of students. It is important to look into how much time does students actually spend online on interacting with the lectures, listening to them and getting involved in academic discussion with the teacher or with other students. The academic measures such as CGPA and the time spent on self-study gets affected by a host of factors that are sometimes controllable and at other times they are uncontrollable. This research is basically about identifying those factors that affect the academic performance of a student in times of crises such as COVID-19 and can be seen to have effects on measurement factors.

## 2. Literature Review

Literature has shown that class size plays an important role in the academic performance (Heinesen, 2010). Researchers such as Diaz (2003) notes that the causal factors of poor academic performance stems from personal causal factors, family causal factors and academic causal factors. The grouping of factors that control academic performance, diverges from one milieu, student and cultural setting to another. Students with robust work integrities are sturdily committed to their work, are more dedicated, and more focused and thus tend to perform better than their peers. It is therefore necessary to look at the role of individual students' efforts in enhancing their academic performance. Students' own efforts play critical role in their academic achievement; they must therefore discover all prospects available within their academic environment. Similar claims are made elsewhere as well, such as previous schooling, students' effort, are identified by Siegfried & Fels, (1979) and Anderson & Benjamin (1994). Other identified factors are parents' education, self-motivation, income of the family (Devadoss & Foltz, 1996), attendance in the class, age of student (Romer, 1993), entry qualifications and learning preferences (Aripin et al., 2008). Abbasi & Mir, (2012) too supported the idea that students' personal characteristics such as entry qualifications, age, work ethics and self-motivation impact the academic performance of the students. Benefits from

these studies can only be received when corrective measures are undertaken that improves the academic performance of the students. Instructor's teaching style and students' learning preferences influences positively the student's academic achievement (Harb & El-Shaarawi, 2006). Learning preference refers to a person's usual, characteristic and favored way of integrating new information (Reid, 1995). This also means that individual students may differ in regard to how they would want to know what is being taught (Aural /auditory learners, Visual learners, Kinesthetic (or tactile) learners, Read/write learners) (Neil Flemming, 2001-2011). Absenteeism and academic performance are also found linked to each other (Romer, 1993); Romer explored the relationship between student's exam performance and attendance (Mlambo, 2011). In another study, Durden and Ellis (1995) studied student differences in ability, milieu and motivation, and it was found that excessive absenteeism does affects academic achievement, thus there is an indirect effect of attendance on learning (Mlambo, 2011). Another factor that affects academic performance is the student's varying admissions criteria to the extent that students getting taught in the same course differ extensively in terms of their prior comprehension (Mlambo, 2011). Since learning is a group process, therefore a student admitted with higher qualifications will be better prepared compared to a student admitted based on the bare minimum qualifications. Same instructions and education material given to differing students in terms of entry qualification, creates declining academic performance. Conscientiousness is another factor that affects academic performance (Woodfield and Earl-Novell, 2006); Woodfield et al. reported that female students outdid their male counterparts because of being more meticulous. Age is another deciding factor in terms of academic performance. More and more mature aged (ages between 21 and 25) students are getting admitted around the world in universities, however, a significant amount of undergraduate students are still 19-year olds (Trueman & Hartley, 1996). Grown-up students lack basic learning abilities necessary for effective study, however, such students even with inferior academic qualification than the young students (Newman-Ford, Lloyd & Thomas, 2009) perform better than young student, thus in contrast to grown-up students, young student's academic achievement can be low. Other factors that determine academic performance include income of the family, education of parents and self-motivation. Similar claims are made in other studies, such as

students' efforts (Anderson & Benjamin 1994), family income, parents' education, attendance in class (Romer, 1993), learning preferences (Aripin et al., 2008), and pre-requisite admission qualifications. Socioeconomic status of students also affects strongly on the academic performance of the students (Sirin, 2005). Parental job losses are also relevant in gauging the academic performance (Maio et al., 2019). Family and academic attributes are the determining factors in students' academic performance (Mukesh Kumar and Prof. A. J Singh, 2017). Other factors include the graduation performance based on the final year university performance, admission test marks, frequency of absenteeism (Romer (1993) recognized that students who were regular in the class scored the highest grades. Short class attendance is also a result of poor assessment process, poorly prepared lectures delivered in an even more absurd manner, and timing of lectures (Durden and Ellis, 1995); while Newman-ford et al., (2009) accredited it to economic issues) and cumulative grade point average (CGPA), internal grade of the student, medium of instruction, school location, school types, family, material resources are the characteristics which affects the student academic achievement the most (M. Kumar, S. Shambhu & P. Aggarwal (2016); Edin Osmanbegović and Mirza Suljic (2012)). Researchers have also found the midterm-1 grade and midterm-2, class assignments and participation, tests and exams, home-work, and participation in competitions or other events, attitude of the students (Maina, 2010), school resources (Maina, 2010), leadership (Maina, 2010), skills and abilities of the teachers, classroom environment (Kudari, 2016), role of parents (Kudari, 2016), psychological and health related factors (Srinivas, & Venkatkrishnan, 2016), visual and hearing impairments (Srinivas, & Venkatkrishnan, 2016), counselling and guidance services (Maganga, 2016), development of study skills, time management, teaching-learning methods, approachability and professionalism of teachers. Other factors that determine the students' academic performance include: changing academic goal, students' academic background, lack of basic and fundamental skills and inability to manage normal schoolwork (Zimmerman, Bandura and Martinez-Pons, 1992).

Besides these factors that affect the academic achievements of the students, literature also talks about those factors that are normally used to ascertain the academic achievements. In this regard, the literature is normally fixated at the use of CGPA.

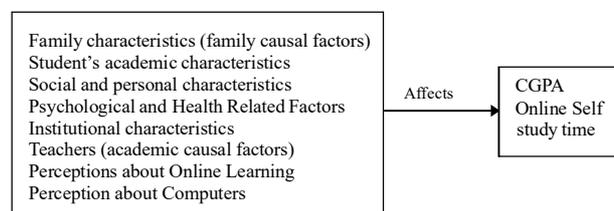
However, in the COVID-19 situation, when the world has moved towards online learning, the Online Self-study Time (OSST) should also be considered as a means to ascertain the academic achievement of the students. Since several computer science course are project based, and such type of learning intends it to be nonconformist, therefore, self-study time is an important factor within computer science. The interest in time investment dates back to “Carroll (1963) who hypothesizes that 'the degree of learning, other things being equal, is a simple function of the amount of time during which the pupil engages actively in learning' (p. 732). Consistently with this argument, evidence has been found that time-on-task (often observed in the classroom; e.g. Hattie, 2009) and study time investment (as reported by students themselves; e.g. Credé & Kuncel, 2008) affect academic performance.” (The role of self-study time in freshmen's achievement). Gijsselaers and Schmidt (1989) affirmed that the time spent on self-study plays a mediating role between group functioning and individual student's achievement. The relation between self-study time and achievement has been extensively investigated. In their review, Frederick and Wahlberg (1980) found that “time spent on learning is positively related to achievement, but they also argue that this relation is influenced by the quality of instruction and student ability.” One could argue that beside the CGPA and OSST, class attendance should also have been used as an academic achievement measure. However, whereas classes are scheduled, students need to plan and monitor their self-study time on their own. This self-interest in the courses also reflects an individuals' motivation to do self-study. Therefore, OSST and not the class attendance should be used as a measure for academic achievement.

### 3. Research Model & Methodology

After careful study of the literature, a research model is proposed that will be used for assessing the effects of the factors that affect the academic achievement of the students during the times of COVID-19. The factors of the research model are drawn from the literature on academic achievement of the students during the times of crises. The research model is shown in the figure 1 given below. The model can be read as follows. The following factors directly affects the CGPA and the Online Self-study time (OSST) during COVID-19 – which are the measures of the academic performance are student's family, his academic, social and personal, psychological/ health

characteristics, and the characteristics of the institution and that of the teachers. A student's perception of online learning, and his perception about using the computers for communication also affects his academic performance.

To test this claim, a questionnaire is distributed to the students of Bachelor of Science in Computer Science admitted in the Federal Urdu University of Arts, Science & Technology, Karachi. A total of 250 students were contacted via email and the students were asked to fill the questionnaire and return the same to the author within 3 days. Only 170 students returned the filled questionnaire by the time this study was concluded. Exhibit 1 shows the sample characteristics and representativeness.



**Fig. 1 : The proposed Research Model**

Literature has shown that the Family characteristic is one of the main factor group identified as affecting the student's academic achievement. This group includes the factors such as socioeconomic situation of the family, parent's level of education and the effect of COVID-19 on the family's income and resources available to them. The other factor group that affects a student's academic achievement is his own academic characteristics. The other factor group found important for academic achievement is his Social and personal characteristics during COVID-19 lockdown. Students that do not interact with others normally online do not perform well in their academic activities as well. Similarly, a students' psychological and health well-being is also an important factor in his academic achievements. If he seeks isolation and don't interact with others even online, then he will fail to have good social and personal characteristics. Institutional characteristics (such as medium of instruction, sound learning management system, good lecture contents etc.) are also important factors that affect the academic achievement of the students.

Lastly, qualification of the teachers, their approachability and professionalism plays important role in keeping the students motivated and enabling them to perform well in academic endeavors. Since

**Exhibit1: Sample characteristics  
and representativeness**

Characteristics	Sample
<b>Gender</b>	170
Male	76
Female	94
<b>Total</b>	
<b>Instructional Level</b>	
Undergraduate	170
<b>Total</b>	
<b>Social Interaction Classrooms</b>	
Zoom	170
Google Classroom	85 (along with zoom)
Whatsapp groups/others	67 (along with zoom)
<b>Platforms</b>	
Moodle or non-Moodle University-developed LMS	170

this study is focused on the factors that affect the academic achievement of students during COVID-19, therefore, it is also important to discuss the Perception of students about communication via computers and the Internet and how much a student is interested in accepting the ease of use of online learning during COVID-19 lockdown.

It is postulated that if students are not at ease with the use of computers and Internet for online learning and communication, than it will affect how much OSST will they report and this will eventually affect their academic achievement. The list of factors identified in this research is listed as under:

**Part I: Factor Measuring the Academic Performance**

- o Year of study
- o Current CGPA
- o Past CGPA before COVID-19
- o OSST before COVID-19
- o OSST during COVID-19

**Part II: Factors Affecting the Academic Performance**

- Family characteristics (family causal factors)

- o Parents Marital Status
- o Family income
- o Parents' level of education
- o Parental job loss
- o Material resources
- o Home environment
- Student's academic characteristics
  - o Students' effort
  - o Previous schooling
  - o Self-motivation
  - o Age of student
  - o Class attendance
  - o Learning preferences
  - o Entry qualifications
  - o Conscientiousness
  - o Pre-university marks
  - o Class participation
  - o Class assignments
  - o Home-work assignments
  - o Class Tests
  - o Examinations
  - o Participation in competitions or other events
  - o Discipline
  - o Diligence
  - o Resourcefulness
  - o Avid reader

- o Devote less time towards recreation and leisure activities
  - o knowledgeable
  - Social and personal characteristics
    - o Socially isolated
    - o Significance of E-mails for communication
    - o Friendly person
    - o Significance of E-mails for undertaking homework and assignments
    - o Significance of E-mails for leisure
  - Psychological and Health Related Factors
    - o Psychologically healthy
    - o Using Internet for educational activities
    - o Importance of Internet for academic purposes
  - Institutional characteristics
    - o Medium of instruction
    - o Better involvement in studies using e-mails
    - o Institutions' location
    - o Emails for better learning experience
    - o Institutions' types
    - o Increased interest in course when using e-mails
    - o University entrance examination
    - o Increased motivation level when using e-mails
    - o Resources available in the Institution
    - o Improved communication between student & teacher using e-mails
  - Teachers (academic causal factors)
    - o Skills and Abilities of the Teachers
    - o Better access to the teacher using e-mail
    - o Approachability and Professionalism
    - o Prompt and better feedback via e-mail from teacher
- Part III: Role of Internet, E-mails and Computers in Academic Achievement
- o Further interest in online education

#### 4. Data Analytics

Construct reliability, indicator reliability, convergent validity, and discriminant validity were used for the measurement of the model using XLSTAT. Composite reliability test for each construct is conducted in order to test construct reliability, which was found to be above 0.837 for all constructs. Cronbach's alpha values were found between 0.70 and 0.90 for all constructs, which suggests the reliability of each construct. All item loadings were above 0.70, indicating that all indicators were reliable. Construct's average variance extracted (AVE) was calculated and was found to be greater than 0.5. Nominal logistic regression or multinomial logistic regression is performed on the data. This analysis models the relationship between a nominal dependent variable and a set of independent variables. SPSS is used to apply multinomial logistic regression. Model fitting information is used to understand whether the

variables you added improved the model statistically significantly compared to the intercept alone (i.e., with no variables added). The significance value both for CGPA and independent variables and OSST and the independent variables were found to be  $p = .027$

**Table1: Model Fitting Information (CGPA)**

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	Df	Sig.
Intercept Only	367.587			
Final	344.863	22.723	44	.027

**Table 2: Goodness-of-Fit (CGPA)**

	Chi-Square	Df	Sig.
Pearson	327.701	294	.341
Deviance	339.318	294	1.035

and  $p = 0.031$  (table 1 and 3), which means that the full model statistically significantly predicts the dependent variable better than the intercept-only model alone.

The Goodness-of-Fit table provides two measures for assessing the fitness of the model to the data. The p-values for both CGPA and independent variables

**Table 3: Model Fitting Information (OSST)**

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	234.681			
Final	217.568	17.113	44	.031

and OSST and the independent variables were found to be 0.341 and 0.279 (table 2 and 4); this shows that the model fits the data well. The third test conducted on the data is likelihood ratio test which reveals those independent variables that are statistically significant.

It was found that the following factors: Non-availability of material resources, Students' previous schooling, Age of the student, Learning preferences,

**Table 4: Goodness-of-Fit (OSST)**

	Chi-Square	df	Sig.
Pearson	170.110	149	.279
Deviance	216.181	149	1.000

Pre-university entry marks, institution type and the university entrance examination were not statistically significant because  $p > 0.05$  (the "Sig." column). On the other hand, all other factors were statistically significant because  $p < 0.05$

## 5. Discussion

Analysis of data has shown that many factors affected the academic performance of the students of computer science during the COVID-19 situation. In the context of this crisis like situation, the unusual factors join the usual factors while shaping the academic performance of the students. The data analysis has revealed that it makes a lot of difference if your biological parents are still together or not. Some students chose not to reply this question. Literature has shown that a biological family supports a student's mental and emotional well-being. Those students that are living in a single parent set-up or are living with step-father or step-mother passes through many emotional issues that either make them too sensitive or too stubborn. Both situations lead to self-destruction. In a lockdown situation, where a person will have to live with a step-parent or live without one of the parent, such a situation becomes even more evident and undeniable. This eventually affects a student's mental peace which then leads to deteriorating grades.

Similarly, income of a family also affects the academic performance of a student. If a student continues with his education when the family is facing financial problems, then it becomes his responsibility to justify the luxury of continuing with the education. Such students are under tremendous pressure of performing well. Even if all other factors are not ideal, students are still not given any space to perform naturally. This leads to undue mental stress and thus in-turn, the students either perform poorly in academics or quit the education all together. Parents' level of education, too plays an important role in the academic performance of the students. Parents that are doing well, even when they are not educated enough would discourage the students from pursuing higher

education and not helping the family in earning the bread. However, this is not always the case.

Many illiterate parents that are still doing well financially, still want their children to study and become something that they themselves never became, such as becoming a doctor or engineer. The stress of parent's job loss also plays an important role in the student's academic performance. Especially in the lockdown, when a parent lost his job, the families became insecure because no one was hiring and the COVID-19 situation was also not improving. In such a situation, students were not sure whether they will be able to continue with their education or not. This form of uncertainty often leads to severe stress and to obvious deterioration of academic performance. Non-availability of material resources played a smaller role in the academic performance. However, home environment played a similarly significant role in the academic performance of students as other factors in this group. In case of student's self-described academic characteristics, it is found that the factor student's efforts played an important role in his academic performance.

Students' previous schooling didn't played much role in his academic performance. A student's self-motivation is found to be an effective factor for academic achievements. A self-motivated student can overcome many shortcomings of the system and personal issues in order to get what he desires, whether it is a good education, good job or good grades. Age of the student didn't affected desire to affect academic achievements. However, it is one of the factors that literature shows is crucial, because normally age difference also dictates maturity among students. From our data set as well as from the literature, it is found that class attendance is an important factor. Those students that do not attend the classes regularly are less self-motivated as well and they have a poor command of the subject as well. Learning preferences is found less effective in our data set. Entry level qualification is found as a factor that affects the academic performance. Those students that had a diploma or certificate of few months to a few years are historically found more mature and academically sound when compared to those students that didn't had any such qualifications and had been admitted on the most basic qualification necessary for the admission to a degree program. Conscientiousness is found an effective component for academic performance. Those students that were found more

supportive to other students also had good grades mainly because while teaching and mentoring others they had developed leadership and communication skills in themselves. Pre-university entry marks were found to have no significant effect on the academic performance of the students in our data set. Factors such as class participation, class assignments, homework assignments, class tests, exams, and participation in academic activities were all found to be significant factors in affecting the academic performance of the students. Discipline, diligence and resourcefulness were also found significant factor that affects the academic performance of the students. Avid reader factor is found to be insignificant in affecting the academic performance of the students. The factor about the time spent on recreational and leisurely activities is also found to be less significant in affecting the academic performance of the students. Many students that are active in sports were also found active in academia. Socially isolated and unfriendly behaviors are historically found factors that affect the academic performance of a student.

Those students that do not seek friendships with their class fellows and also avoid going to social gatherings with their class fellows perform poorly in academia and also later on in their life. Such students are also found to have less stability in marriages and in their careers. Similarly, those students that do not have an emotionally stable life and are psychologically affected by their personal situations are historically found to be less effective in their own lives. Such students do not spend a quality life and thus their academic performance is also very low. Moreover, such students are also very frequent in hospital visits and often remain sick and tired, thus affecting their academic performance. Institutional characteristics were found to be a crucial factor that affects the academic performance of the students. Literature has shown that environment of the institution and conveniences have substantial influence on students' performance (Lizzio, Wilson and Simons, 2002). A smaller class-size could also improve learning, moreover accessibility to the adequate research and teaching equipment could meaningfully improve students' performance (Darling- Hammond and Synder, 2001). Further, physical resources, equipment, student and teacher ratio, and teaching tools have substantial influence on academic achievements.

A physical setting with enhanced facilities provides security, comfort, enhances interest in the

courses and can be useful in terms of increased learning and performance (Devadoss and Foltz, 1996). They further highlighted that a social collaborating setting inspires contribution and improves students' creative skills. An interactive environment with the freedom to choose tasks, supported for being different, taught to face failures and encouraged to participate in decision making enhances student's skills and achievement. Medium of instruction, institution location, and the resources available in the institution were found to be the factors affecting the academic performance of the students. Whereas the institution type and the university entrance examination were found to have no effects on the academic performance. Skills of the teachers were also found to be crucial in better academic performance of the students. According to Abbasi and Mir (2012) physical assets and staff proficiency are significant in influencing the performance of students. Trigwell, Prosser and Waterhouse (1999) highlighted the fact that effectual teaching consequences in improved learning conclusions and increases students' quantitative academic outcomes. Hence improving teacher standard can be used as an instrument in increasing students' achievements. Heinesen (2010) further confirmed that teachers' aptitude and capability prove important in improving students' performance and that instructors' teaching style improves understanding of concepts trained.

Approachability and professionalism of the teachers is also found to have played a significant role in the academic performance of the students. Scandals related to teachers and other staff members of the university creates lack of motivation in students and this in turns leads to absenteeism among them. Engin-Demir (2009) noted that lecturers play vital job in promoting educational achievement and performance. He confirmed that teacher's knowledge of the subject matter, qualification, eagerness, communication with students, method of lecture delivery and encouraging participation in discussions have positive and significant impact on students' attainment. Engin-Demir (2009) therefore suggested using the appropriate teaching methodologies, amenities and electronic equipments by teachers to assist in learning. They emphasized the dramatic effect this has on the students in terms of increased learning and performance. Similarly, James (1998) and Gainen (1995) suggested the use of inclusive teaching and learning approaches as per the requirement of the varying levels of academic needs. This will provide the interaction between the staff,

students and institutional structures. The institutional infrastructure has a great impact on the students' academic outcomes, therefore, universities should be dedicated and eager to expand strategies that can assist the learning within their environments.

Since this research is conducted in the backdrop of the COVID-19, therefore, a major concern regarding the academic performance of the students was whether they are comfortable with online learning, their opinion about communicating via emails and their concerns regarding undertaking academic tasks online. Therefore, the third part of the questionnaire is directly related to this. It is found that the comfortability working with Internet is found to be related to whether the students would opt for online learning or not. Those students that would not want to work with the Internet more often must have faced immense problems while going through the lockdown phase during academic session.

Soon after the pandemic had started, all educational institutions turned to online learning. The students coming from under-developed areas such as small villages, and from areas under crises, were not too familiar with the frequent use of computers and the Internet. Those students already had very weak vocabulary of English known to them. Once the online teaching became a routine, they were forced to learn to work with the Internet and computers almost instantly – something that they were not familiar with. This led to discomfort and agitation among the students. Such students eventually saw their grades falling and their performance getting weak. Moreover, those students that were unfamiliar and uncomfortable working with the Internet and computers also faced discomfort while doing online activities such as searching relevant material on the Internet. They were the most worried students when the instructor would ask them to send assignments online. They would often call and send messages to the instructor ensuring that the teacher had actually received their assignment. Since many Learning Management Systems also allow setting deadlines for submitting the assignments, and provide means to upload them as well, which also means that once the deadline is over, there is normally no way to submit the assignments, therefore the students that are uncomfortable working with the Internet and the computers always found themselves approaching the teacher to give them extra time to submit their assignment. For them, doing online activities was a tense and uneasy process and they

would never enjoy doing these activities. Many of them would altogether ignore the online activities and vow to avoid them even in the future. However, those students that would find it comfortable to work with the Internet, also found it easy to do online activities. Those students would not find it uneasy to submit assignments online, and perform online activities. They would also never ignore any chance to perform any future online activities. Their academic performance is better than those that find it difficult to work with the computers and the Internet. Such students find working with the Internet, valuable knowledge. They would find communicating with the email very important. They would also find doing homework and assignment with the help of Internet very valuable. They would use the emails and Internet for leisurely chat and communication as well and would initiate to use the same for educational activities as well. They get involved in educational activities using email more frequently. They would find it easy to communicate with their teacher more frequently and easily. They would also recommend using the Internet, computers and the emails to others.

They would enjoy their courses even more when learning online. This also increases their level of motivation. Student's comfort in using the computers and Internet and in using the Learning Management System for regular study affected both the CGPA as well as the Online Self Study Time (OSST). Spearman's rho values had indicated that there is a relation between the factors identified in this research and the CGPA and OSST. Students that disagreed with most questions or marked the concerning options also reported lower CGPA and less OSST.

## 6. Conclusion

This research was focused on identifying those factors that influences the academic performance of the students, especially in the perspective of COVID-19. It is found that the literature does not offers any dedicated review of those factors that influence the academic performance of the students living in crises like situation. This work is an effort to address this gap in the perspective of COVID-19. A model is proposed that opines that Family characteristics (family causal factors), Student's academic characteristics, Social and personal characteristics, Psychological and Health Related Factors, Institutional characteristics, Teachers (academic causal factors), expediency of studying through internet/LMS and sensitivity to

communication via Computers are detrimental in terms of the academic performance of students that are living in COVID-19 affected areas. The students would be socially isolated however they would be connected online through applications such as Zoom, Google Classroom and other similar tools. They would be using the internet and computers more often than they used to in normal circumstances. A questionnaire is formed that consisted of items formed around the factors proposed in the model. One hundred and seventy students had filled the form. The analysis shows that except for the following factors: Non-availability of material resources, Students' previous schooling, Age of the student, Learning preferences, Pre-university entry marks, institution type and the university entrance examination, all other factors were found significantly affecting the academic performance of the COVID-19 affected socially distant yet technically connected through learning management systems, internet and computers. For measuring the academic performance of the students, both CGPA and Online Self- study Time were used. This research will be further improved and shall be reported in research journals.

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