

## **Dealing With 1<sup>st</sup> Year University Students "Computer Anxiety"**

Chris Panagiotakopoulos

*Hellenic Open University*

Gerasimos Koustourakis

*Hellenic Open University*

### **ABSTRACT**

The introduction of computers in every workplace, as well as the education, at a rapid pace, is not always problem-free. The existence of anxiety or phobia towards computers has been proved by many researchers to be a problem, which indeed imposes restraints on any future encounters one may have with computers. In order to establish the existence of any such anxiety or phobia in the workplace or education, this study was conducted by means of a specially designed questionnaire within a sample of first-year students at the Department of Primary Education – University of Patras. The test was carried out both before and after a six-month course on computers so as to enable any deviations in anxiety to be traced. The results showed that the sample initially exhibited symptoms of computer anxiety, which was, however, drastically reduced at the end of the course. There were generally no significant differences between the sexes insofar as the degree of anxiety was concerned (except for one anxiety-provoking factor). Finally, the statistical analysis granted a high degree of reliability to the questionnaire used.

## INTRODUCTION

Many researchers [1, 2, 3] have recorded the existence of "technophobia", as this is expressed with anxiety, detestation, or a general negative attitude of the subject towards technology. With the introduction of computers in every day life and their radical extensive application in almost every workplace, computer anxiety or the phobia towards computers (computerphobia) consists a real phenomenon [4, 5], and it can be said that it's rather the crucial point of technophobia. According to Hess & Miura [6] and Scott & Rockwell [7] among others, computer anxiety has to do with avoiding the computer on many levels of "encounter".

Rosen & Weil [8] in their determination of the main symptoms of technophobia included the following:

- anxiety towards any present or future interactions of the man with computers or any types of technology based on them.
- a general negative attitude of the man towards computers, their function and their influence on society, and
- special negative cognitive functions of the man while operating a computer or when considering his future relation with computers.

The degree of computer anxiety can easily change. According to researchers, its reduction depends on many factors such as gained experience or education received on computers [9, 10, 11, 12]. Rosen & Maguire [2] showed that there is inverse relation between the experience or knowledge on computers and computer anxiety.

Computer anxiety is also related to age, sex, the influence computers have on society,

the subject's cultural background, as well as his/her anxiety towards mathematics [9, 13, 14]. According to researchers, certain aspects of computer anxiety prevail each time, due to the influence of the above variables, which vary from case to case.

In this study we examined the degree of computer anxiety as this is formulated by the "Introduction to Computers and Data Processing", which is a one-semester course. The sample used was taken from the 1<sup>st</sup> year students at the Department of Primary Education – University of Patras during academic year 1997-1998. Therefore, our main research question is, whether the specific sample experiences any computer anxiety and how the degree of this type of anxiety is modified after the provision of the above mentioned course.

It's worth mentioning that no similar research on the issue of computerphobia as experienced by students of teachers' training colleges, that is future to be teachers, has been conducted in the Greek context. These students, will soon be called to use computers as a methodological tool, since according to the plans of the Ministry of Education, the introduction and implementation of the computers in the Greek Primary Education is aimed at.

## METHODOLOGY

In this research, an attempt was made to address the problem of computer anxiety among 1<sup>st</sup> year students of Primary Education Pedagogical Studies. More specifically, volunteers were asked to complete a questionnaire (in Greek) before attending the course on the structure and the use of computers (January 1998). They were asked to complete the same questionnaire at the end of the course (June 1998). The sample that

completed the questionnaire before the beginning of the course is hereinafter called S1 whereas the sample that completed the questionnaire at the end of the course is called S2. S2 is a proper subset of S1.

During lectures, while retaining a high scientific profile, an attempt was made towards debunking the structure, the use as well as the applications of the computers. To this end, historical data relating to the making of computers were presented and the effects computers have on our life as well as the boundaries between modern computers and science fiction were discussed and analyzed with the participation of the students. Also, certain components and computer peripherals were carried into the classroom so as the students would be given the opportunity to see, touch and feel the way they are connected to each other as well as how they operate.

It's also noteworthy that, apart from the lectures, the students had to participate in introductory workshops for a total of 20 hours on the function of computers, on Microsoft Windows as well as Microsoft Word. They also received practice on a daily basis by doing simple program exercises in Microsoft QBASIC language.

The questionnaire used in this study comprised of two parts.

In the first part general information on the following was collected:

- sex
- age
- the Course Cycle attended at Senior High School
- possession of any degree or diploma
- existence of computer at home
- the use of computers in preparation of homework

- the use of computers at free time in any given way
- participation in seminar/s on computers in the past.

The second part of the questionnaire contained 28 closed-type questions in two parts with the possible answer on a five-point Likert scale of the type: *not at all* (1 point), *a little* (2 points), *quite a lot* (3 points), *a lot* (4 points), *very much* (5 points). Subsequently, through groups of relevant questions, the following five test areas were set (see Appendix) in order to determine the degree of anxiety, fear or threat of the subject arising from:

1. *The possibility of using a computer and its peripherals.*
2. *The possibility of their participation in discussions or meetings on computers.*
3. *Their presence in places where computers are installed.*
4. *The belief or the feeling that computers consist an indispensable part of our every day life, while, with their applications, they have a tremendous effect on the formation of the modern social and professional circumstances.*
5. *The awareness of the possible negative effects on every day life or the society itself, from the invasion of modern technology as this is expressed through computers.*

From now on, the degree of anxiety referred to in each one of the above cases (anxiety-provoking factors) will be referred to as *SAS1\_1*<sup>1</sup>, *SAS1\_2*, *SAS1\_3*, *SAS1\_4* and *SAS1\_5*, respectively for the sample that completed the questionnaire prior to attending the course and, as *SAS2\_1*, *SAS2\_2*, *SAS2\_3*, *SAS2\_4* and *SAS2\_5*, respectively, for the sample that completed the questionnaire after having attended the course (see Appendix).

---

<sup>1</sup> SAS1\_1: StressAnxietySample1\_factor1, etc.

The questionnaire used was based on the Computer Anxiety Rating Scale (CARS), duly modified and adjusted by the authors to fit the Greek reality. The CARS scale was introduced by Raub [15] and has been updated as situations arose every time (in terms of time, culture, subjects, etc). The main versions thereof are those put forward by Heller & Martin [16], Heinssen, Glass & Knight [17] and Rosen & Weil [13] known as CARS-C. It must be noted that the CARS scale is a very popular tool for researchers and that many studies on computer anxiety have been carried out along its main guidelines [4, 9, 13, 18, 19, 20].

The reliability coefficient (Cronbach's alpha) of the questionnaire was found to be excellent for both samples S1 ( $\alpha = .8854$ ) and S2 ( $\alpha = .9347$ ) and it can be compared to similar studies carried out by Rosen & Weil [13], Anderson [9] and Yaghi & Abu-Saba [18].

## RESULTS – DISCUSSION

In order to trace the existence of "anxiety towards computers" related to variables such as sex, possession of degree or diploma, the use of computer in preparation of homework, the use of computer at spare time, and past participation in seminar/s on computers, we used the statistical *t* – test (applied to all cases of stress-provoking factors, i.e. SAS1\_1 to SAS1\_5 and SAS2\_1 to SAS2\_5) [21]. To trace the relation between "computer anxiety" and the Course Cycle attended at Senior High School, we used analysis of variances (One-Way ANOVA) [22]. Although the scale used is ordinal, these types of scales could be considered as interval scales in statistical analysis [23].

The sample main characteristics for S1 and S2 are as follows:

1. Sex:

Table 1. Main characteristics of Sample 1 (S1) and Sample 2 (S2)

	Size (N)	Male	Female
S1	89	21 (23.6%)	68 (76.4%)
S2	61	14 (23.0%)	47 (77.0%)

2. Age:

78 subjects (87.6%) from S1 were between the ages of 18 and 22, while 11 (12.4%) were over 22. The average age was 20.5 years (minimum being 18 and maximum being 32 years).

56 subjects (91.8%) from S2 were between the ages of 18 and 22, while 5 (8.2%) were over 22. The average age was 20 years (minimum being 18 and maximum being 31 years).

3. Possession of a degree or diploma: 9 from S1 (10.1%) and 5 from S2 (8.2%).

4. Course Cycle attended at Senior High School: The majority of S1 and S2 samples comprised of candidates who had attended 3<sup>rd</sup> Course Cycle as it can be seen from the following table (2):

Table 2. Course Cycle of S1 and S2

Course Cycle	S1	S2
1 <sup>st</sup>	5 (5.6%)	2 (3.3%)
2 <sup>nd</sup>	5 (5.6%)	1 (1.6%)
3 <sup>rd</sup>	71 (79.8%)	53 (86.9%)
4 <sup>th</sup>	7 (7.9%)	5 (8.2%)
5 <sup>th</sup>	1 (1.1%)	0 (0%)

According to the Greek Education System, valid at the time this research was carried out, students who have attended the 1<sup>st</sup> Course Cycle have received a greater amount of studies in Science, Chemistry, and Mathematics. Those who have attended the 2<sup>nd</sup> Course Cycle have received a greater amount of studies in Science, Chemistry, and Biology. Those students who have attended the 3<sup>rd</sup> Course Cycle have received a greater amount of studies in Language, Literature, and History. Those who have attended the 4<sup>th</sup> Course Cycle have received a greater amount of studies in Mathematics and Economics, while those who have attended the 5<sup>th</sup> Course Cycle have received a more general tuition at Senior High School level without having specialized in any particular subject.

5. Existence of a computer at home: 12 from S1 (13.5%), 13 from S2 (21.3%).

6. The use of computers for the preparation of homework: 3 from S1 (3.4%) and 6 from S2 (9.8%).

7. The use of computer at spare time: 10 from S1 (11.2%), 7 from S2 (11.5%).

8. Participation in seminar/s on computers: 14 from S1 (15.7%), 9 from S2 (14.8%).

Table 3 shows the descriptive results of the answers of the students from S1 regarding the sources of anxiety. This table shows the mean, the standard deviation, the minimum and the maximum<sup>2</sup> of the students' answers as well as the number (N) of those who answered each question.

Table 3. Main descriptive results of sample S1

---

<sup>2</sup> The decimal numbers in the values of "minimum" and "maximum" are due to the fact that these values result from the respective averages of the questions, which formulate the picture for each case – variable.



Variable	Mean	St. Deviation	Min	Max	N <sup>(3)</sup>
For the whole sample before attending the course:					
SAS1_1	2.20	0.68	1.00	4.17	87
SAS1_2	2.13	0.73	1.00	4.40	85
SAS1_3	2.46	0.86	1.00	5.00	85
SAS1_4	2.21	0.60	1.29	3.71	80
SAS1_5	2.39	0.73	1.14	4.71	86

It is evident from Table 3, that *there is computer anxiety in our sample* and that the stress-provoking factors can be classified in the following order: SAS1\_3, SAS1\_5, SAS1\_4, SAS1\_1, and SAS1\_2. It seems that *the physical presence of the subjects in places where computers are installed* is a major stress-provoking factor with *the awareness of the possible negative effects from the intrusion of modern technology and its expression through computers* following.

Table 4 shows the descriptive results of the answers given by the students from S2 regarding the sources of anxiety. This Table shows the mean, the standard deviation, the minimum and maximum of the students' answers as well as the number (N) of the students who answered each question.

Table 4. Main descriptive results of sample S2

Variable	Mean	St. Deviation	Min	Max	N <sup>(4)</sup>
----------	------	---------------	-----	-----	------------------

<sup>3</sup> The size of the sample (N) varies according to variable since it represents the number of the valid answers to each question.

<sup>4</sup> The size of the sample (N) varies according to variable since it represents the number of the valid answers to each question.

For the whole sample after attending the course:

SAS2_1	1.89	0.72	1.00	4.17	60
SAS2_2	1.78	0.78	1.00	4.40	60
SAS2_3	1.47	0.53	1.00	3.00	60
SAS2_4	1.86	0.68	1.00	3.57	57
SAS2_5	1.88	0.74	1.00	4.14	60

From Table 4, we can see that *there is still computer anxiety* in our sample even after the completion of the course, *which is considerably reduced*. Table 5 shows the degrees of anxiety before and after taking the course as well as their reduction in number:

Table 5. Degrees of anxiety before and after taking the course

Factors	Before	After	Difference
1	2.20	1.89	.31
2	2.13	1.78	.35
3	2.46	1.47	.99
4	2.21	1.86	.35
5	2.39	1.88	.51

From table 5 it is derived that the greatest reduction occurred first in the third and then in the fifth factor. It must be noted, however, that these two factors played in the same order a major part in the formation of stress before attending the course. Reduction followed successively in the second, fourth and fifth factors.

The comparison of the average of the degrees of anxiety originating from the respective

sources in samples S1 and S2 using t-criterion showed a statistically significant difference between the degree of anxiety before and the degree of anxiety after the completion of the course ( $p < .05$ ) in all the stress-provoking factors SAS1\_1, SAS2\_1, SAS1\_2, SAS2\_2, SAS1\_3, SAS2\_3, SAS1\_4, SAS2\_4, SAS1\_5, SAS2\_5.

A further analysis of the use of t-test showed the following:

- 1) Relation between sex and "computer anxiety": In the case of S1: A statistically significant difference between the sexes ( $p < .05$ ) in the degree of anxiety in relation to stress-provoking factor SAS1\_2. In other words, it became evident that females, when participating in discussions about computers, are more stressed than males. In the case of S2: There was no significant difference between the two sexes in the formation of "computerphobia" in relation to all stress-provoking factors studied (SAS2\_1 to SAS2\_5).
- 2) As for those who were holding a degree or diploma and those who were not, no significant difference became apparent from the statistical analysis for both S1 and S2, insofar as the influence of all the stress-provoking factors (SAS1\_1 to SAS1\_5 and SAS2\_1 to SAS2\_5) studied was concerned. It must once again be stressed that the overwhelming majority of the sample had received theoretical tuition at Senior High School.
- 3) Insofar as the possession of a computer at home is concerned, the statistical analysis for both S1 and S2 showed a statistically significant difference in relation to all the stress-provoking factors SAS1\_1 to SAS1\_5 and SAS2\_1 to SAS2\_5 ( $p < .05$ ).

In other words, those of the subjects who did not have a computer at home were more stressed (in relation to most of the stress-provoking factors) than those who did have a computer at home.

4) In terms of using a computer at spare time the statistical analysis showed the following:

S1: A statistically significant difference throughout all stress-provoking factors SAS1\_1, SAS1\_2, SAS1\_3, SAS1\_4 and SAS1\_5 ( $p < .05$ )

S2: A statistically significant difference in relation to stress-provoking factors SAS2\_1, SAS2\_2, SAS2\_4, and SAS2\_5 ( $p < .05$ ).

This means that those subjects that did not use a computer in any way in their free time were more stressed (in relation to most of the stress-provoking factors) than those who did.

5) Insofar as participation to seminars on computers is concerned, the following became evident from the statistical analysis:

S1: A statistically significant difference in relation to stress-provoking factors SAS1\_1, SAS1\_2, SAS1\_3, and SAS1\_4 ( $p < .05$ ).

S2: A statistically significant difference in relation to stress-provoking factors SAS2\_1, SAS2\_2, and SAS2\_4 ( $p < .05$ ).

This means that, as opposed to those subjects who had participated in seminars on computers, those who had never participated in similar seminars were more stressed (from most of the stress-provoking factors).

6) In the case of those subjects who used a computer to do their homework and those who did not, the statistical analysis showed the following:

S1: A statistically significant difference in relation to stress-provoking factors SAS1\_1, SAS1\_3, SAS1\_4 and SAS1\_5 ( $p < .05$ ).

S2: A statistically significant difference in relation to stress-provoking factors SAS2\_1, SAS2\_3, and SAS2\_5 ( $p < .05$ ).

This means that those subjects who used a computer for their homework were less stressed than those subjects who did not.

- 7) In tracing the relation between "computer anxiety" and the Course Cycle attended at Senior High School, the analysis of variances (One-Way ANOVA) for both S1 and S2 samples did not show any statistically significant differences. We should however point out that the overwhelming majority of the sample used had received the same (theoretical) education at Senior High School.

## CONCLUSIONS

A study of the analyzed results shows that there was a general "anxiety towards computers" among the studied sample of the first year students of the Department of Primary Education – University of Patras, due to the introduction of computers in our every day life.

This anxiety seemed to be reduced drastically after the completion of the six-month course with the help of the proper seminar and the contribution on the part of the lecturer.

Generally, no connection between the degree of "computer anxiety" and sex became evident (apart from one case in S1). Once again, no connection was established between the degree of "computer anxiety" and the possession of a degree or diploma (probably due to the fact that the sample comprised of students who had received theoretical tuition at Senior High School), or between the degree of "computer anxiety" and the age of the subjects.

On the contrary, statistically significant differences were established for both S1 and S2

samples between those who:

- had a computer at home and those who did not
- used a computer in their free time and those who did not
- had attended seminars on computers in the past and those who had not
- used a computer in doing their homework and those who did not.

These differences relate to most, if not all, of the five stress-provoking factors.

If we now take into account the following facts:

- (a) the students who were examined are prospective teachers,
- (b) computers have now become an indispensable part of our every day life, and
- (c) a full scale introduction of computers as a subject covering computers per se, computers as a tool for the student, and its application in the communication on the Internet, in all levels of education,

it becomes apparent that it is imperative for those conditions to be created which will facilitate a smooth and problem-free approach towards the use of computers both on the part of the teachers and the students.

At least on the surface level, the results of this study showed that *carefully designed courses can drastically reduce the degree of "anxiety towards computers"*, something which the modern teacher needs. In this study, however, the course carried out was specifically orientated, initially debunking the computer, later offering knowledge on the computer itself, and finally (to a very small degree) using computers as a teaching aid.

## REFERENCES

1. Fisher, M. Computerphobia in adult learners. *Computer Education*, June, 14-19 (1991)
2. Rosen L. & Maguire P. Myths and realities of computerphobia: A meta-analysis. *Anxiety Research*, 3, 175-191 (1990)
3. Jay, T. Computerphobia: What to do about it. *Educational Technology*, 1, 47-48 (1981)
4. Tseng, H., Macleod, H. A.& Wright, P. Computer Anxiety and Measurement of Mood Change. *Computers in Human Behavior*, 13(3), 305-316 (1997)
5. Moldafsky, N. I. & Kwon, I. W. Attributes affecting computer aided decision making – a literature survey. *Computers in Human Behavior*, 10, 299-233 (1994)
6. Hess R. & Miura I. Gender differences in enrolment in computer camps and classes. *Sex Roles*, 13, 193-203 (1985)
7. Scott C. & Rockwell S. The effect of communication, writing and technology apprehension on likelihood to use new communication technologies. *Communication Education*, 46, 44-62 (1997)
8. Rosen, L. D.,& Weil, M. M. Computers, classroom instruction, and the computerphobic university student. *Collegiate Microcomputer*, 8, 275-283 (1990)
9. Anderson, A. Predictors of computer anxiety and performance in information systems. *Computers in Human Behavior*, 12(1), 61-77 (1996)
10. Ayersman, D. Effects of computer instruction learning style, gender, and experience on computer anxiety. *Computers in the Schools*, 12(4), 15-30 (1996)

11. Crable, E. A., Broozinski, J. D., Scherer, R. F., & Jones, P. D. The impact of cognitive appraisal, locus of control, and level of exposure on the computer anxiety of novice computer users. *Journal of Educational Computing Research*, 11, 329-340 (1994)
12. Marcoulides, G. A. The relationship between computer anxiety and computer achievement. *Journal of Educational Computer Research*, 4, 151-158 (1988)
13. Rosen, L. D., & Weil, M. M. Computer anxiety: A cross-cultural comparison of university students in ten countries. *Computers in Human Behavior*, 11(1), 45-64 (1995)
14. Allwood C. M. & Wang, Z. Conceptions of computers among students in China and Sweden. *Computers in Human Behavior*, 6, 185-199 (1990)
15. Raub A. C. *Correlates of computer anxiety in college students*. Doctoral dissertation. University of Pennsylvania (1981)
16. Heller R. S., & Martin C. D. Measuring the level of teacher concerns over microcomputers in instruction. *Education & Computing*, 3, 133-139 (1987)
17. Heinssen, R. K. Jr., Glass C. R. & Knight L. A. Assessing computer anxiety: Development and validation of the Computer Anxiety Rating Scale. *Computers in Human Behavior*, 3, 49-59 (1987)
18. Yagi M. H. & Abu-Saba M. B. Teachers' Computers Anxiety: An International Perspective. *Computers in Human Behavior*, 10, 299-233 (1998)
19. Marcoulides, G. A., & Wang, X. A cross-cultural comparison of computer anxiety in college students. *Journal of Educational Computing Research*, 6, 251-263 (1990)
20. Marcoulides, G. A., Rosen L. D., & Sears, D. C. *The Computer Anxiety Scale*. Dominguez Hills, CA: California State University (1985)
21. Katsillis M. J. *Descriptive Statistics – Applied in Social Sciences and Education*.



Patras, University of Patras Press (1995)

22. Loftus G.R. & Loftus E.F. *Essence of Statistics*. New York: Alfred A. Knopf (1988)

23. Makrakis, V., Evaluation of Open and Distance Education Systems, In D. Vergidis, A. Lionarakis, A. Lykourgiotis, V. Makrakis and C. Matralis, *Open and Distance Education – Principles and Functions*, Vol I, Patras: Hellenic Open University (1998)

## APPENDIX

The questionnaire with 28 closed type questions used in this research is as follows:

A) Do you feel stressed or scared:

- 
1. While touching a computer.
  2. While holding a floppy disk in your hands
  3. Thinking that you could damage its components while using a computer.
  - SAS1\_1* 4. Sitting in front of a computer without knowing how to use it.
  - or* 5. Sitting in front of a computer and messages keep appearing on its screen
  - SAS2\_1* to the effect that you did something wrong.
  6. Sitting in front of a computer and attempting to operate it by using the keyboard or the mouse.
- 
7. Every time you have to attend a seminar on computers.
  8. Finding yourself in a conversation among people who are computer
  - SAS1\_2* literate.
  - or* 9. Being with people who talk using computer jargon.
  - SAS2\_2* 10. Being with people some of who are computer technicians or programmers.
  11. Hearing a relative or friend saying that his/her computer broke down.
-

---

*SAS1\_3* 12. When there are computers installed in the same place as you.

*or* 13. Visiting a computer shop.

*SAS2\_3* 14. Watching someone using a computer comfortably.

---

---

15. Thinking that you might be asked at some stage to use a computer as part of your teaching process.

16. Hearing that the use of computer is expanding rapidly.

17. Hearing that someone can now play chess with his opponent being a  
*SAS1\_4* computer.

*or* 18. Watching a film in which the computer prevails over a human being.

*SAS2\_4* 19. Hearing that intelligent computers have been developed today.

20. Hearing that there is a computer program, which can be used for the subject you are teaching.

21. When you were showed a document by a friend of yours and you were told that it was done by a computer.

---

B) Do you feel that:

- 
22. You are threatened or undermined by people who are computer literate?
23. Machines will substitute or replace human beings, as technology improves?
24. Human beings lose their humanity when dealing with a computer?
25. There is a reversal of roles in that the human beings have become slaves of modern technology rather than masters of a modern tool?
- SAS1\_5*
- or*
26. The intrusion of technology in our every day life (e.g. banking, clinical reports, Citizens' Registry) causes an undesirable dependence on computers?
- SAS2\_5*
27. Your connection to an "information network", e.g. the Internet, could contain the risk of other people intruding your private life in any way possible?
28. Mr X who opposes openly, e.g. through newspaper articles or interviews, against using a computer is right in doing so?
- 

As it can be seen from the above: Factors SAS1\_1 or SAS2\_1 were introduced through grouping questions 1 to 6 of the questionnaire, factors SAS1\_2 or SAS2\_2 through grouping questions 7 to 11, factors SAS1\_3 to SAS2\_3 through grouping questions 12 to 14, factors SAS1\_4 to SAS2\_4 through grouping questions 15 to 21, while factors SAS1\_5 to SAS2\_5 through grouping questions 22 to 28. The prefix SAS1\_ applies to

Panagiotakopoulos, C., Koustourakis, G. (2001). Dealing with 1<sup>st</sup> year University Students "Computer Anxiety". *Themes in Education*, 2, 1, 35-46.

factors prior to attending the course, while the prefix SAS2\_ to factors after the completion thereof (sample S2).

---

*Correspondence should be addressed to: Chris Panagiotakopoulos, Hellenic Open University, Sahtouri 16 & Ag. Andreou, 26223, Patras, Greece (e-mail cpanag@eap.gr).*