

Telework and its effect on professionals' performance, motivation, the environment and economy

Mag. Carmen Andrés Jiménez

Distance State University (UNED), 474-2050 Mercedes de Montes de Oca, San José-Costa Rica;

candres@uned.ac.cr;

ABSTRACT

Telework is used in UNED, USA and Europe. The time and money savings as well as the contribution to the environment and economy, increases motivation and productivity. The effect of telework over these aspects was analyzed. 11 chair professionals were interviewed and the activities of this position were classified as telework possible and not possible. The telework possible activities were done from home and at the office. The saving at home and the expense were measured. Significant differences were found between the performance from home and the performance at the office. The savings are higher when people telework, but there are distractions. A positive impact was demonstrated on the environment and the economy. The motivation is bounded to all the former, but discipline is needed to succeed. Pilot plans for UNED employees are recommended to determine work periods, performance and the effect of distractions.

KEY WORDS

Telework, performance, economy, environment, motivation, flexibility, discipline.

1. INTRODUCTION

Telework is a work strategy starting to be used at UNED. In August 2008, the University started a telework pilot plan involving 30 employees. They were selected by their antiquity and nature of functions. This plan ended in February 2009 and a second stage started with 100 more employees “[7]”. This stage ended in January 2010 and the results haven't been published yet.

Telework has been used for many years now in the USA and Europe. The telework report of the Government of the United States released in August 2009, shows how telework has implications in a personal and social level, since it helps people balance their activities at home, increases security in neighborhoods and diminishes pollution “[8]”. There are also many associations related to this field, like the ones located in Canada and Virginia.

In Europe, telework is becoming a necessity and keeps increasing since it has so many advantages for workers. For example, the swine influenza, which raised an important alert during the year 2009, was one of the reasons telework increased in Europe “[1]”.

Latin America has different options for the worker to learn about this topic. For example, the Hispanic Teleworkers network, is a website where knowledge and expertise is shared, as well as job offers (<http://www.teletrabajador.net/>). Likewise, there is a Telework International Conference (ITA) that will be held in Argentina, in which themes like work inclusion, sustainable development, new relationships at work and other variables will be developed (<http://telework2010.tic.org.ar>).

Different ways to telework have been developed. The first categories developed were: rural telework, telework from home, telework from home with a mobile office and telework from telecenters. The most common is the one developed from telecenters (34.5%), the second is the mobile office (25.5%) and telework from home (14.5%) “[10]”.

Another advantage of telework is the possibility it offers for handicapped people, since they can work from home and therefore be more productive “[6]”. Nevertheless, a handicapped person is not going to work from home 5 days a week, it will depend on the circumstances of his or her job “[9]”. For instance, if a person works in a factory, he or she cannot work from home every day, but if a person works in an administrative position, this is more possible.

Since telework necessarily implies reduction of expense in transportation, the levels of pollution in the environment should go down. A study done by ETO home during the year 2000 showed this “[3]”.

In a personal level, telework has many advantages such as: motivation, flexibility to organize itself, increase in production, diminishing of expenses and time saving “[3]”.

At an economical and social level, the advantages have also been studied and proved. Nevertheless, a community study revealed it is necessary to investigate more about work stress, the new schedules of telework and the effects of isolation “[4]”. These topics will be studied in this investigation, since the flexibility telework brings is not necessarily positive or doesn't increase the performance of employees. Although telework has many benefits in an individual and enterprise level and society, there are also empty spaces that need to be studied and investigated.

As for isolation, it is difficult to separate work from family life. The fact of being home, a place that represents comfort and relaxation, as well obligations (which also has to do with gender), can generate different problems that will be aborted in this investigation.

Another disadvantage that has been found, is social barriers or prejudices, because people think that a person that works from home doesn't work at all. The companies can also experience loss of control, lack of communication and loss of

the team spirit. Other disadvantages are the loss of control of technical issues, the lack of control over the private information of the company and the distractions of the worker at home “[10]”.

The purpose of this investigation was to analyze the effect telework has over professionals’ performance, motivation, the environment and the economy, in order to determine advantages and disadvantages of telework and generate recommendations from the perspective of a University in Costa Rica.

2. METHODOLOGY

The methodology used for this study was the following:

2.1 Diagnosis of the perception of telework from the chair professionals’ point of view

A survey was applied (see Appendix 1) to 11 chair professionals, which is a representative sample of the population of chair professionals in the University (71 people). The following formulas were used to determine this sample size according to “[2]”:

$$n_1 = \frac{\left[z \sqrt{p(1-p)} \right]^2}{d}$$
$$n = \left\lceil \frac{n_1}{1 + (n_1 / N)} \right\rceil$$

According to the survey, different important conclusions were drawn for this study.

2.2 Classification of the chair professionals’ activities

- i) A list of all the activities done by the Agroindustry chair professional during the third term of 2009 was made.
- ii) The list was classified as “telework possible” and “not telework possible”.
- iii) The “telework possible” activities were done from home and at the office, so that comparisons could be made and determine significant differences between the performance of the professional working from home and the performance of the same professional working at the office.

2.3 Measurement of the chair professional’s performance and motivation

- i) A list of the objectives of the Agroindustry chair during the third term of 2009 was done.
- ii) The level of compliance of these objectives from home as well as the office was determined.
- iii) A comparison to find significant differences in the chair’s performance was done.

2.4 Measurement of expenses and their impact on the environment and economy

- i) A measurement of the time used daily activities done either at the office or from home was done.
- ii) These periods of time were compared, and significant differences were determined.
- iii) A measurement of the electricity, internet, telephone and maintenance of the equipment used at home was done. Also, an approximate of the expenses of the university for each chair professional was estimated. Significant differences were determined.

In order to analyze all the data, the “t student” test was applied, so that relation between two variables could be found in each case “[5]”.

3. RESULTS

3.1 Diagnosis of the chair professionals’ perception of telework

Eleven chair professionals’ were interviewed, six men and five women, all from San José (which means they are near the university, relatively). Most of them are from 36 to 50, but their answers didn’t differ among them because of the age ($t_{0.05, 16} = 0.2591$). Also, they have been working at the university from two to seven years. This didn’t affect their responses significantly either ($t_{0.05, 16} = 0.2591$).

Out of the people that were interviewed, 55% of them perform telework. The ones that don’t, were requested to answer the questions thinking about what they would want their telework to be if they did it. No significant differences were found between the answers of the people that telework and the people that don’t ($t_{0.05, 18} = 2.101$). Most of them telework or would telework at least 1 day a week, but not more than 3 days. The kind of activities most of them perform or would perform are very similar (see Appendix 4, in which these activities are shown. They are the ones that the Agroindustry chair performed during the third term of 2009, but they are similar to the ones the interviewed mentioned).

Most of the chair professionals find teleworking as a positive aspect of their lives and it doesn’t seem to affect their work, especially when it comes to helping students, since they have assistants or coworkers that call them on their cellphones if a student needs something urgent. The University has a schedule to help students, but this is not really respected by them. They call any time, and sometimes this is a problem, considering the chair professionals not only telework, but have to travel or be away from the office for different reasons.

As for the use of equipment and resources, 45% of the chair professionals consider the university should provide them with equipment to work from home, while another 45% don’t think so.

On the other hand, only one person considers telework makes people work more than they should, but 82% of the people interviewed don’t think so, although it would be better to work by objectives instead of having a specific schedule.

The most important distractions found in telework, according to the survey, are the attention given to the family during work hours and the necessity to run errands from time to time. However, a balance between these distractions and a work plan designed from the start, done with discipline, is the key to success in this field.

3.2 Classification of the activities of the Agroindustry chair professional

The activities done by the Agroindustry chair during the third term of 2009 are shown in the next chart:

Chart 1. Activities done by the Agroindustry chair during the third term of 2009

Activity*
Chair coordination
Curricular design of courses
Investigation projects
PADD
Audiovisual material production

* The detail of each one of the activities is in Appendix 3.

According to the activities mentioned, a classification was made based on the criteria of the Agroindustry chair and on the responses of the chair professionals.

The activities that turned “telework possible” were: audiovisual material production, PADD, investigation projects, curricular design of courses and the chair meetings. The rest of the activities of chair coordination needed to be done from the office. The classification can be seen in Appendix 4.

According to this classification, the time that can be used to telework per term is 244 hours, which can be translated into 15 hours per week (2 days). The time that needs to be used for office activities is therefore 3 days a week. According to the survey, there were people that work 3 days or would like to. This should be studied, since the necessary time to be at the office is 3 days.

3.3 Measurement of the performance and motivation of the chair professional

The objectives that were accomplished week by week by the Agroindustry chair are shown in chart 2.

Chart 2. Activities classified as telework possible, accomplished from home as well as at the office by the Agroindustry chair during the third term of 2009

Obj/ Month	Weeks	Proposed telework from home	% of compliance	Proposed telework at the office	% of compliance
---------------	-------	--------------------------------	--------------------	------------------------------------	--------------------

September	1	Chemistry curricular description I (part 1) 575 curricular description (part 1)	100%	Audiovisual material #2 (part 1) Chair coordination	80%
	2	Chemistry curricular description I (part 2) Audiovisual material #2 (part 1)	90%	Chair coordination 575 curricular description #2 (part 2)	80%
	3	575 curricular description (part 2 and 3) 575 curricular description (part 2)	80%	575 curricular description (part 4)	100%
	4	Vacations	-	575 curricular description (part 3)	50%
October	1	Seminar	-	Audiovisual material #3 (part 1)	80%
	2	Chemistry lab II curricular description I (parte 1) Chair coordination	100%	575 curricular description (part 3) Chair coordination	65%
	3	Audiovisual material #4 y 5 (part 1)	90%	575 curricular description (corrections)	80%
	4	Chair meeting Chair coordination	100%	Audiovisual material #4 y 5 (part 2) Preparation of an Extension course	60%
November	1	Finish Audiovisual material	70%	Conference	-
	2	Conference	-	575 curricular description (corrections)	70%
	3	Annual report (part 1) Chair coordination	100%	Annual report (parte 2)	60%
	4	Chair meeting Chemistry II curricular description (part 1 and 2)	100%	Extension course	-
December	1	Holliday	-	Proposal of necessary equipment to buy at the Investigation center (part 1)	80%
	2	Proposal of necessary equipment to buy at the Investigation center (part 1 and 2) Chair coordination	80%	Chair meeting Chair coordination	70%
	3	Vacations	-	Vacations	-
	4	Vacations	-	Vacations	-

Significant differences were found between the performance obtained working from home and the performance obtained working at the office ($t_{0.05,20} = 3.4409$).

According to this, the percentage of fulfilled objectives obtained for each activity that was done from home was higher than the percentage obtained at the office. Thus, the distractions at the office low the performance, such as unexpected meetings, unexpected arrivals or calls from students (since they call or arrive regardless of the fixed schedule of the university). Besides, there are projects that need to be attended at the office, complaints, final acts, academical loads, school consuls, institutional acts or watching test performance.

On the other hand, even when the performance obtained working from home is higher, there are also distractions that could cause problems, such as personal phone calls, family matters (specially small children), television, music, food (which can cause food disorders), plus the necessity of doing house shores (although in the survey done to the eleven chair professionals this wasn't showed).

Saving money and time through telework is a clear motivation, as well as its benefits to society and the environment, but this lifestyle doesn't necessarily adjust to everyone or every job. This was confirmed by the chair professionals that were interviewed, who said a high commitment and degree of discipline is needed to achieve success in this area.

In addition to this, since communication systems are not entirely developed at UNED, it is necessary to implement systems where virtual meetings can be done, so that isolation can be avoided among workers, like the ones some companies have. This would help create new relationships between workers, since virtual relationships are the ones needed and UNED is still far from having these systems.

3.4 Measurement of expenses and its impact in environment and economy

Considering the type of function the chair professional does, it is not possible to perform telework for 5 days a week. Therefore, the expenses during telework and normal work days were calculated, taking into account the permitted days to work from the office (3 days) and from home (2 days).

i) Measurement of time

The time used in all the daily activities at the office and during telework was measured and the results are shown in the following chart:

Chart 3. Comparison of the time used teleworking 2 days a week and at the office 3 days a week

Place of work	Time to get ready	Lapse of time traveling (going and coming back)	Total of hours per month
---------------	-------------------	--	--------------------------

Home	-	-	-
Office	2 hours	1 hour	36 hours

When it comes to time saving, the advantage of teleworking is evident and very beneficial for the worker, since the time that remains can be used in sleeping more, exercising, running errands, taking kids to school, being with friends and family, writing books that need to be written outside the work schedule and more. The application of an statistical test is not necessary in this case since the difference is too obvious to be tested.

ii) *Measurement of expenses*

In the following chart, the expenses and savings generated teleworking and working at the office are shown:

Chart 4. Expenses and savings generated per month, working 2 days from home and 3 days at the office

Place of work	Gasoline	Food	Clothes	Telephone	Electricity	Water	Internet	Difference**
Home	Saving: ¢8000 (\$16)	Expense: ¢ 16000 (\$31)	Expense: ¢10 000 (\$20)	Expense: ¢1000 (\$2)	Expense: ¢4000 (\$6)	Expense: ¢500 (\$1)	Expense: ¢200 (less than \$1)	¢23 700 (\$46)
Office	Expense: ¢12 000 (\$23)	Expense: ¢ 48000 (\$93)	Expense: ¢ 20 000 (\$40)	NI*	NI*	NI*	NI*	¢80 000 (\$154)

*Since this is an institutional information, this can't be proved in this investigation, but it is very possible that UNED wins when someone works from home.

**This difference is what the chair professional spends considering savings and expenses.

According to the last column of Chart 4, it is clear that when a person works at the office, the percentage spent is a lot higher than the one spent teleworking. Every day, \$5 are spent teleworking, while at the office, the chair professional has to spend \$12.7. The cost of working at the office is double and the economical and environmental advantages are clear (no need to calculate a statistical difference for being evident). For example, the fact of not using the vehicle twice a week, helps the person save and contributes to the environment. Also, if we added the gasoline and therefore, the carbon emissions that 71 chair professionals working 2 days a week from home would save, there would be an important amount. As for the expenses, these chair professionals would save up to \$4000 a month and \$48000 a year.

Also, the fact of not dealing with traffic at least twice a week is another stress factor that the person doesn't have to face, an excellent way of keeping emissions from getting to the environment and a motivation for the employees and the employers.

CONCLUSIONS

- The amount of years worked at UNED doesn't make chair professionals see telework in a different way.
- Most of the chair professionals that were interviewed think telework has a positive impact on their lives.
- In order to succeed in telework, discipline, control of distractions and working by objectives is needed.
- The curricular design of courses, investigation and the chair coordination are activities that can be done through telework.
- Student's complaints, meetings, institutional gatherings and student's attention are activities that need to be done at the office.
- A chair professional can telework for not more than 2 days a week.
- The performance of the Agroindustry chair profesional in the telework activities was significantly better than the performance at the office.

RECOMENDATIONS

- Investigate more at UNED about telework, so that more employees are involved and more results, tendencies, performance and its relation with motivation can be studied.
- Start an investigation in which people that work 3 days a week participate, so that its feasibility can be determined, since the necessary time to be at the office is 3 days a week according to this investigation and conclude about it.
- Investigate the effect distractions have on the performance of UNED employees that telework, and find the best way to control them.

BIBLIOGRAFY

- [1] Bardera, P. 2010. *El teletrabajo puede frenar la expansión de la gripe A*. PC world. <http://www.idg.es/pcworldtech/El-teletrabajo-puede-frenar-la-expansion-de-la-gri/art195377-seguridad.htm>; consultado el 6 de Mayo, 2010).
- [2] Chaves, O. 2009. *Métodos estadísticos para las ciencias naturales*. EUNED. San José, Costa Rica.
- [3] ETO. 2000. *Telework (Telecommuting): the benefits-and some Issues!*. <http://www.eto.org.uk/faq/faq03.htm>; consultado el 6 de Mayo, 2010).
- [4] Huuhtanen, P. 2007. *Implicaciones del teletrabajo en la seguridad y la salud*. <http://www.arearh.com/salud%20laboral/teletrabajosalud.htm>; consultado el 6 de Mayo, 2010).
- [5] Lowry, R. 2010. *VassarStats: Website for Statistical Computation*. (<http://faculty.vassar.edu/lowry/VassarStats.html>; consultado el 6 de Mayo, 2010).
- [6] Mata, A. 2010. *Teletrabajadores gozan de grandes beneficios*. La Nación. (<http://www.nacion.com/2010-03-07/EIPais/Relacionados/EIPais2292204.aspx>; consultado el 6 de Mayo, 2010).
- [7] Quesada, M. 2008. *Funcionarios institucionales iniciarán teletrabajo en Setiembre: UNED, primera Universidad en el país en iniciar esta modalidad*. Acontecer. UNED. (<http://www.uned.ac.cr/acontecer/noticias/Teletrabajo.html>; consultado el 5 de Mayo, 2010).
- [8] United States office of personnel Management. 2009. *Status of telework in the Federal Government: report to the Congress*. (http://www.telework.gov/Reports_and_Studies/Annual_Reports/2009teleworkreport.pdf; consultado el 5 de Mayo, 2010).
- [9] U.S. Equal Employment Opportunity Commission. 2005. *Work At Home/Telework as a Reasonable Accommodation*. (<http://www.eeoc.gov/facts/telework.html>; consultado el 6 de Mayo, 2010).
- [10] Viales, C. 2003. *El teletrabajo como una opción laboral*. www.hacienda.go.cr/.../El%20teletrabajo%20como%20una%20opcion%20laboral; consultado el 6 de Mayo, 2010).

APENDIX 1. Survey about advantages and disadvantages of telework applied to chair professionals of UNED

DISTANCE STATE UNIVERSITY
AGROINDUSTRY CHAIR
NATURAL AND EXACT SCIENCES SCHOOL

Date: _____

Name of the chair you have in charge: _____

School in which you work: _____

Dear coworker:

Thank you for taking the time in answering this survey. The objective of the former is to know your opinion about telework, its advantages and disadvantages and how to improve it within the University.

INSTRUCTIONS

For each of the following affirmations, please mark in the parenthesis with an x, the affirmation you think is best for each question.

1. ¿What is your gender?

- () a. Masculine
- () b. Femenine

2. ¿How old are you?

- () a. Less than 25
- () b. 26-30
- () c. 31-35
- () d. 36-40
- () e. 41-45
- () f. 46-50
- () g. More than 50.

3. ¿Where do you live?

- () a. San José
- () b. Alajuela
- () c. Cartago
- () d. Heredia
- () e. Puntarenas
- () f. Guanacaste
- () g. Limón.

4. How long have you worked in UNED?

- () a. Less than a year.
- () b. 1 to 2 years.
- () c. 2 to 5 years.
- () d. 5 to 7 years.
- () e. More than 7 year.

5. ¿Have you teleworked before? () Yes () No

Regardless of your answer, answer the following questions considering what you're doing now (if you telework or has done it for some time) or what you would like to do if you had the chance.

6. ¿How many days a week do you telework or would like to telework?.

- a. 1 day.
- b. 2 days.
- c. 2 days and a half.
- d. 3 days.
- e. 4 days or more.

7. ¿Which are the activities that you can perform teleworking?.

8. ¿Which are the activities that you necessarily need to perform at the office?.

9. ¿How do you handle student's attention when you're home or how would you handle it if you had to?.

- a. You have an assistant that helps you and calls you on your cellphone if it's urgent.
- b. You leave your office alone, but there are other coworkers that can answer your phone for you.
- c. The next day you listen to your messages on your machine, but the risk you take is that someone calls and doesn't leave a message.
- d. You don't know what happens when you're not at the office.

10. Telework affects some of your work functions negatively.

- a. Disagree very much.
- b. Disagree.
- c. Don't disagree and don't agree.
- d. Agree.
- e. Agree very much.

11. Telework is very beneficial for your work economically, socially and institutionally speaking.

- a. Disagree very much.
- b. Disagree.
- c. Don't disagree and don't agree.
- d. Agree.
- e. Agree very much.

12. UNED should provide you with a computer and other supplies to telework.

- a. Disagree very much.
- b. Disagree.
- c. Don't disagree and don't agree.
- d. Agree.
- e. Agree very much.

13. Out of the following distractions, which ones have you experienced when you telework:

- a. Unexpected errands.
- b. Home obligations.
- c. Television.
- d. Home comfortness.
- e. Attention to family in work hours.
- f. Food disorders.

14. ¿Do you consider working by objectives a way to make more flexible distractions during telework?

- a. Yes b. No

15. Telework obligate you to work more hours than needed because of the distractions this generates.

- a. Disagree very much.
- b. Disagree.
- c. Don't disagree and don't agree.
- d. Agree.
- e. Agree very much.

16. ¿Which has been your clue to manage success teleworking or which one do you think would be your secret to succeed?

¡Thank you very much for your help!

Appendix 2. Results of the survey applied to the 11 chair professionals of UNED about telework

Question/ Person	1	2	3	4	5	6	7	8	9	10	11
1	b	b	A	a	a	a	a	b	b	a	b
2	f	g	D	e	e	g	g	d	d	d	c
3	a	a	A	a	a	a	a	a	a	a	a
4	c	d	E	e	e	e	e	c	e	d	b
5	a	b	A	b	a	b	b	b	a	a	a
6	d	a	C	c	c	a	a	c	a	a	a
7*											
8*											
9	a	a	d	a	b	b	d	d	a	a	b
10	a	a	a	a	a	e	c	e	a	a	a
11	e	e	e	e	e	a	c	a	e	e	e
12	e	c	e	c	c	e	c	c	a	e	e
13	a	e, f	a, b, e	a, b, e	e	a,b,c,d,e , f	a,b,c,d,e, f	a, e	e	e	b, d, e, f
14	a	a	a	a	a	a	a	b	a	a	a
15	a	a	a	a	a	a	c	a	a	d	a
16**											

*Open questions. The answers were similar, and they are explained in the results.

**This is an open question, the answers are discussed with the results.

**APPENDIX 3. DESCRIPTION OF THE ACTIVITIES DONE BY THE AGROINDUSTRY CHAIR DURING THE
THIRD TERM OF 2009**

Activity	Description	Time assigned per term
Chair coordination		
Student's complaints	Red tape, system process. 16 complaints arrive every term.	32 hours (each complaint takes 2 hours), per month, there are 4 complaints, per week, 2 hours, 1 complaint
Chair coordination	The chair coordination implies controlling the courses daily, making sure everything is updated.	226 hours (16 hours per week)
Watching students take tests	This is done three times during the term	18 hours (each one takes 6 hours)
Student's attention	Student's go to the office Tuesday and Thursday, from 1:30 p.m. to 4:30 p.m.	96 hours
School Consuls	4 hours each consul, once a month	16 hours
Chair meetings	4 hours each meeting, once a month	16 hours
Academic load elaboration	It takes three full days to do this and this has to be done with the system that is at the office	24 hours
Test revision	This is done twice per term. 30 minutes each time.	1 hour
Curricular design of courses		
Agroindustrial Chemistry I	The design of the courses is about stablishing all the activities involved in learning a specific course, from methodology to evaluation.	30 hours
Agroindustrial Chemistry II		30 hours
Agroindustrial Laboratory I		30 hours
Agroindustrial Laboratory II		30 hours
Investigation		
Support and tesching in inocuity and quality to small producers in the rural zone, San Carlos, Costa Rica	In this investigation rounds need to be done in the field to gather information about the small compannies and guide them about innocuity and quality. Plus, teaching and bibliographical investigation was done.	2 days for tours 4 days for training 30 hours for investigation
PADD		
This is a program which the university usese to help students with their doubts and comments, through e-mail and telephone.	This system needs to be checked at least 3 times a week as well as the answering machine students use.	20 hours
Audiovisual material design		
The script for the audiovisual material of 10 laboratories was designed.	In the scrip, step by step is mentioned how the laboratory is to be done.	30 hours

Appendix 4. Classification of the activities done by the Agroindustry chair professional during the third term of 2009

Activity	Classification
Student's complaints	Office
Watching students taking tests	Office
Chair coordination	Telework
Student's attention	Office
School Consuls	Office
Chair meetings	Telework
Academic load elaboration	Office
Tests revision	Office
Curricular design of courses	Telework
Investigation	Telework
PADD	Telework
Audiovisual material design	Telework