RATE OF CAMPUS WIDE INFORMATION SYSTEMS ADOPTION IN NOVICE USERS AND ITS RELATIONSHIPS WITH COMPLEX ADAPTIVE SYSTEMS

by

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Dedication

With all my heart to my lovely Wife: **Florina**, light of my life.

To my Daughter: **Ana Sofía** and her happiness.

To my Daughter: **María Paulina** and her loveliness.

To my Mother: **Martha** and her unconditional love.

To my Father: **Jesús** and his intelligence.

To my Siblings: **Rosa Ana**, **Luis Miguel** and **Mauricio**.

To my committee: Reuben, David, and Rafael.

To my Club (in ascii): Eusebio, Joaquín, Jaime, Rafael, Gerardo, Enrique, Raúl, Luis, Enrique, and Carlos.

To all my Friends and Colleagues.

And GOD.

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Publication N°.___________________

Martín de Jesús González Martínez, Ph.D.

Instituto Tecnológico y de Estudios Superiores de Monterrey, 2008

Main Advisor: Reuben McDaniel Jr.

When an organization is examined as a Complex Adaptive System (CAS) one is able to suggest that they take information from environment, and use this information to adapt themselves and change their own behavior.

The CAS study in Organizational Theory has revealed that systems must operate far from equilibrium; where, by both negative and positive feedback, they are driven to paradoxical states of stability and instability, predictability and unpredictability. Two commonly observed characteristics of complex systems are a large number of interacting elements and emergent properties.

A Campus Wide Information System can be defined as a set of interrelated components that collect or retrieve, process, store, and distribute information to support decision making and control in an University or College. Communications Systems theories emphasize there are two important elements of context, task and social influence. Most important is social influence, which affects perceptions of the task, the tools and their qualities, and their relevance to the task. Particularly when a communication medium is new, other people's opinions cause a strong influence on new users.

Use of Complex Adaptive Systems (CAS) Theory is helpful to understand the factors that might affect the rate of CWIS adoption, because it offers a solid base about the non-linear interactions between things, actors, and situation interlinked with. Deterministic theories, instead, try to use a rigid frame with chained trigger actions to comprehend complex relationships.

TASA DE ADOPCIÓN DE UN

SISTEMA DE INFORMACIÓN DE CAMPUS EN USUARIOS NOVATOS Y SU RELACIÓN CON SISTEMAS ADAPTIVOS COMPLEJOS

Publication N°.___________________

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Cuando una organización se analiza como un Sistema Adaptativo Complejo (SAC), se puede decir que toma la información del medio ambiente y utiliza esta información para adaptarse y cambiar su propio comportamiento.

El estudio de SACs en la Teoría de la Organización ha puesto de manifiesto que los sistemas deben operar lejos del equilibrio, donde por retroalimentación negativa o positiva, son impulsados a estados paradójicos de estabilidad e inestabilidad, previsibilidad e imprevisibilidad. Dos características comúnmente

observadas de los sistemas complejos es que tienen un gran número de elementos interactuantes y propiedades emergentes.

Un Sistema de Información de Campus (SIC) se puede definir como un conjunto de componentes interrelacionados que recuperan o capturan, procesan, almacenan y distribuyen información para apoyar la toma de decisiones y el control en una Universidad. Las teorías de Sistemas de Comunicación hacen hincapié en que existen dos elementos importantes del contexto, las tareas y la influencia social. Lo más importante es la influencia social, que afecta a la percepción de la tarea, las herramientas y sus cualidades, y su importancia para la tarea. En particular, cuando un medio de comunicación es nuevo, las opiniones de otras personas causan una fuerte influencia sobre los nuevos usuarios.

El uso de la teoría de Sistemas Adaptativos Complejos es útil para comprender los factores que podrían afectar a la tasa de CWIS adopción, ya que ofrece una base sólida sobre la no-linealidad de las interacciones entre las cosas, actores y la situaciones interrelacionadas. Las teorías determinísticas, en cambio, tratan de encontrar un modelo mecánico con acciones que desencadenan otras acciones para comprender las relaciones complejas.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1. Importance of Research and Literature Review

The purpose of this research was to find factors that affected the rate of adoption of a Campus Wide Information System (CWIS) by novice users. This research will contribute to a better understating of the intersection of Complex Adaptive Systems (CAS) and CWIS by showing us how the novice users' perception affects their introduction to an unfamiliar CWIS.

Introduction

The technical nucleus of an organization determines the degree of diversity, complexity, unpredictability, and interdependence. As greater technical complexity produces an increased structural differentiation, greater technical uncertainty leads to decreased formalization and centralization of the structure; while greater technical interdependence requires greater coordination. (Kamps, J. & Pólos L., 1999).

In order to assure stability, an organization can use specific strategies to cushion the surrounding disturbances in the technical nucleus; but these shock absorbers can be inadequate and uncertain (Hedberg, B. & Jonson, S., 1978) and may penetrate the technical nucleus (Hitt, L., & Snir, E., 1999). The demands of technology in the organizational structure can be summarized by the amount of information that must be processed during the execution of a sequence of tasks (Thompson, 1967).

Following the norms of rationality, if the environment is complex, an organization is more likely to build barriers around its technical nucleus, surrounding it with input and output components. For example, there are organizational rules to use Information Systems: password for users or different granularity access in data bases.

An organization will attempt to reduce the complexity of its environment by smoothing input and output transactions: for example, help desks or frequently asked questions list.

An organization will challenge to predict the amount of uncertainty and fluctuation in a complex environment (Nayar, 1993), for example: Organizations offer courses and training programs to support people for the correct use of the information system.

The view of organizations as Complex Adaptive Systems (CAS) suggests that organizations gather information about their surroundings, themselves and their own behavior (Kauffman, 1995) and then use this information to adapt to their environments. (Ashmos, D. & Huber, G., 1987; Ashmos, D., Duchson, D. & McDaniel, R., 2000).

Organizations as Complex Adaptive Systems

Organizations could be viewed as dynamic systems which contain multiple parts that interact with one another and the environment (Morel & Ramanujan, 1999;

Scott, 1982; Seel, 2003). Two commonly observed characteristics of complex systems are large number of interacting elements and emergent properties. Interactions are typically associated with the presence of feedback mechanisms in the system; they introduce nonlinearities in the dynamics of the system (Stacey, 1996; Styhre, 2002). The appearances of patterns due to the collective behavior of the components of the systems are called emergent properties.

Chalquist in 2003 proposed ten characteristics for CAS:

First, agents in organizations are arranged around interactions and within hierarchy of interrelated subsystems; managers are the executive subsystem, while employees are the functional subsystem. These subsystems could have both weak and strong boundaries since certain decision-making cannot be done by employees while certain skilled operations cannot be done by managers. Depending of the level of analysis, an agent may represent an individual, a project team, a division, or an entire organization. Agents have varying degrees of connectivity with other agents through which information and resources can flow. Agents have schemata that are both interpretative and behavioral. Schemata may be shared between the collectives that make up an organization’s culture, or may be highly individualistic (Bak, 1996).

Second, wholeness: the system is greater than the sum of the parts. Agents grow in a linear way, while interactions grow in a non-linear way (most of the times growing exponentially). Complex Adaptive Systems (CAS) resist simple reductionist analyses, because interconnections and feedback loops prevent holding some subsystems constant in order to study others in isolation (Anderson, 1999).

Third, each part of the system affects all others: Everything is connected to everything else. Adequate interactions or distorted interactions can change the status of the system, balancing at the edge of chaos. When the quality of connections is randomly distributed the capability of variety in behavior is improved, enhancing the capacity of self-organizing which in turn leads to adaptability. (Ashmos, D., Huonker, J. & McDaniel, R., 1998).

Fourth, interrelations are emphasized more than components: nonlinear system wide ripples are emphasized more than linear ones. For this, no one can completely predict the behavior of the system; little deviations can produce great or small changes, or even have no visible effect at all. Behavior in a CAS is induced not by a single entity but rather by the simultaneous and parallel actions of agents within the system itself. The behavior of a CAS is emergent.

Fifth, circular causality emphasizes the present and the process while linear causality emphasizes the past and the content. Present changes follow an uncertain process with feedback. Past changes can be traced backwards to diagnose problems, but cannot change present situations or events (Santosus, 1998).

Sixth, self-regulation via feedback loops is used to maintain dynamic stability (Negative feedback toward stability, positive feedback toward change). Vicious or virtuous circles are immediately obvious examples of positive and negative feedback loops in organizations (Stacey, 1995). The nonlinearity of feedback loops are essential properties of organizational life. Behavior patterns can emerge without being planned and in fact often emerge contrary to intention, producing unexpected and counter intuitive outcomes.

Seventh, synergy: interactions and feedback loops add to each other as they combine (a dynamic expression of wholeness). Many actions are irreversible (Driebe, 1999) and have path dependence (Sterman, 2000).

Eighth, equipotentiality: agents with the same original conditions can go different ways.

Ninth, equifinality: agents with different original conditions can turn out the same.

Finally, tenth, CAS exhibit self-organizing behavior: even when starting in a random state, CAS usually evolves toward order instead of disorder. Organization structures created by managers with formal paths and agents for communications and command usually also have informal paths with different agents in charge.

All properties fall in two general classes: Static Complexity, which addresses how an object or system is put together (only purely structural informational aspects of an object), and is independent of the processes by which information is encoded and decoded; and Dynamic Complexity, which addresses how much dynamical or computational effort is required to describe the information content of an object or state of a system. One must note that while a system's static complexity certainly influences its dynamical complexity, the two measures are not equivalent. A system may be structurally rather simple (have a low static complexity), but have a complex dynamical behavior.

Importance of Complexity in Organizations Theory

The Complexity science provides very different models for how organizations work (Mainzer, 1997; Waldrop, 1992; Kauffman, 1995; McDaniel & Driebe, 2001; Chen, 1999; Dooley, 2002). Opposite to the machine model, Complexity Theory suggests that organizations are organic, and living systems (Capra, 2002; Fitzgerald & Eijnatten, 2002; Eijnatten & vanGalen, 2002; Luhmann, 1995).

The Complex Adaptive Systems study in Organizational Theory has revealed that in order to produce creative, innovative, continually changeable behavior, systems must operate far from equilibrium; where, by both negative and positive feedback, they are driven to paradoxical states of stability and instability, predictability and unpredictability (Stacey, 1995; Edgar. 1996; McDaniel, Jordan & Fleeman, 2003).

In 1999, Mathews, White & Long proposed that social systems in general and social organizations in particular, would appear to be prime examples of organized complexity. It seems reasonable that insights from the complexity sciences should be examined with the goal of furthering our understanding of how complex systems, such as organizations, change and transform over time.

Complex Adaptive Systems may exhibit a chaotic behavior. This is not a lack of order, but order of Complexity that is difficult or impossible to describe in simple terms and that cannot be broken down into simple equations. This behavior often requires complex narrative to describe it (Dhillon & Ward, 2002). In this research framework the authors consider chaos as a property embedded in CAS.

According to Gleick (1988), the concept of chaos suggests an absence of organization, a disorder in which uncertainty and unpredictability predominate. This would seem a strange field of study to unite with Information Systems, which is predominately concerned with order (Bechtold, 1997). However, Chaos refers to what might be called ordered disorder (Thietart & Forgues, 1995).

Patterns are present in chaotic behavior, but they are not regular or easily predictable (Tsoukas, 1998; Weick, 1985). When considering chaos in the context of organizations, it should be noted that it is the complexity of human behavior and actions which will give raise to chaotic phenomenon (Guastello, 1995; Richards, 1990). The concepts of chaos may be a better explanation of organizational behavior than the more traditional explanations of scientific management, since organizations are complex and a dynamic phenomenon (Pigliucci, 2000; Levy, 1994).

As Helfer (1998) stated, complexity and chaos are different but linked. Chaos explains how complex things arise from simple systems; complexity explains how simple things arise from complex systems (Keene, 2000; Cartwright, 1991). Chaos explains how simple non-linear systems lead to extremely complicated behavior;

complexity explains how simple interactions of many things (often repeated) lead to higher-level patterns. Chaos explains how to recognize, describe, and make meaningful predictions from systems that exhibit that property; complexity explains how a complicated system can lead to surprising patterns, when the system is looked at as a whole (Dent, 1999). Chaos uses a reductionist analysis, explaining phenomena in terms of simple entities or already explained things, and the interactions between them; complexity uses a reductionist analysis, explaining macro-level phenomena directly in terms of the most basic elements, without using resources in intermediate levels (or without resources for the intermediate levels)(Fitzgerald & Eijnatten, 2002a; Murray, 1998).

Information Systems and CWIS

An information system can be defined as a set of interrelated components that collect or retrieve, process, store, and distribute information to support decision making and control in an organization (Laudon & Laudon, 2004; King, Gruber & Hufnagel, 1989; Stump & Sriram, 1997).

An information system within an organization should be established on the basis of clearly defined potential benefits (Gathers, R. & Sutherland, A., 1991). It must be said that the people component of information systems is different than the hardware and software components. While there are a limited amount of information systems in organizations (Ryssel, R., Ritter, T. & Gemünden, H., 2004), there are many more people and each one of them is unique; people are less predictable than either hardware or software; people live and work as members of a community; and, the most obvious, people have feelings, sensitivities and needs. People live and work in the organization community and culture far beyond their role as components of the information system (Connolly, 1999).

Information Systems are intended to facilitate the accomplishment of institutional goals (Martin, W., Brown, V., DeHayes, W. Hoffer, J. & Perkins, C., 1999). Hardware and software are planned, evaluated, purchased, installed and exploited to further those goals (Connolly, 1999; Broadbent, M., Weill, P. & St. Clair, D., 1999; Jonston & Vitale, 1988). While people can be viewed as components of an information system, Kant's Categorical Imperative implies that they ought not to be considered solely as components of an information system, no matter how important the system may be to the organization (Mason, 1986). "Technology is not nature, but man. It is not about tools, it is equally about how man lives and how man thinks" (Drucker, 1989)

Traditionally, information sharing among university members has relied on a range of printed materials. Computer technology created opportunities on university campuses for sharing data and information between the staff and the students, and has been deployed since the late fifties (Sullivan, 1996). University information systems range from library systems, registration systems, and financial systems, to campus-housing systems and other university service systems.

A Campus Wide Information System (CWIS) is a computer-based integrated information system providing information about various aspects of a college campus. CWIS has been around for some time and was originally developed on mainframe computers, but is now available on a variety of platforms. The term has broadened to include information systems in schools and other campus-type institutions (Ford, 1994). For the purposes of this study, a CWIS refers to an academic platform to interact and archive selected information about professors' lectures, student's homework and alumni cooperative work. Related elements in a CWIS are e-mail, chat room, topics schedule, and homework drop box (Connolly, 1999).

Actis (1995) argued that the selection and organization of information (content) is the most important consideration if the CWIS is to be used well. It should contain information that is informative, and even entertaining, because it has to motivate the user to want to explore it further (Klein, B., Goodhue, D. & Davis, G., 1997). The menu structure must be organized in such a way that the novice user can find the needed information intuitively (Redman, 1995); however, a design problem always arises when novice people try to use a system, since designers select skilled users as model users (Laudon & Laudon, 2004); and this expert users have a different view about CWIS services. Web-based solutions are accepted nowadays because they reduce the costs of client configuration for each new version, have lower user training costs, use the existing infrastructure and support personnel, and can be accessed from anywhere, anytime and on many (or any) devices (Changiz, Moeeny & Jowsan, 2004).

In this work, CWIS is understood as a collection of information among teachers and students; all materials teachers select for their pupils and all materials students create, manage and transfer between themselves and to teachers: like homework, essays, exams and quizzes.

Because CWIS affects not only a large portion of the campus population, but also influence the campus culture, the views and perspectives of stakeholders from across the campus community need to be recognized and weighed; it is no longer enough to limit considerations to technical issues and the bottom line in budgets (Connolly, 1999).

Social Influence and CWIS

CWIS is a communication tool and an information resource. Its resources can be accessed only through communications networks (Klobas, J. & Clyde, L., 1998). Library and information Scientists have tended to see the CWIS primarily as an information resource, hence their emphasis on information quality and accessibility (Ryssel, R., Ritter, T. & Gemünden, H., 2004). However, other points of view can be found in the literature of communications systems and of information technology and information systems.

Communications systems theories emphasize the contextual aspects of use over the system’s quality characteristics. The two important elements of context, task and social influence, are critical to these theories. Most important is social influence, which affects perceptions of the task, the tools and their qualities, and their relevance to the task (Fulk, J., Schmitz, J. & Steinfield, C., 1990). Particularly when a communication medium is new, other people's opinions cause a strong influence on new users (Markus, 1990).

Early work on information systems use in organizations also recognized the importance of social influence. The support of managers is, for example, a critical social influence on workers' attitudes to information systems and their use (Lucas, 1978).

Social psychologists have long recognized how strongly social influences motivate human behavior (Ajzen, I. & Fishbein, M., 1977). A parent's approval or disapproval strongly influences a child's behavior; a teenager's peer group strongly influences choice of recreational activities and clothing; adults are likely to read books and attend events recommended by friends and colleagues.

Klobas & Clyde (1998) demonstrated how social influences affected portal use in a CWIS study in Australia in the early 1990s. Using structural equations modeling, she demonstrated that a limited set of social influences (peers and co-workers) had a strong influence on CWIS used of perceived information quality. Following Ajzen (1985), Kloba's model (Figure 1) explains networked information resource use as a function of intentions to use the information resource. Intentions are formed from attitudes of outcomes of use, included perceived usefulness and enjoyment of use, and perceived control of use, included perceived accessibility and convenience. These attitudes, in turn, reflect users' perceptions of the quality of the information resource. All these influences are affected by the social context of use, including management support, colleague and peer group influences, family and friends expectations, and the media.

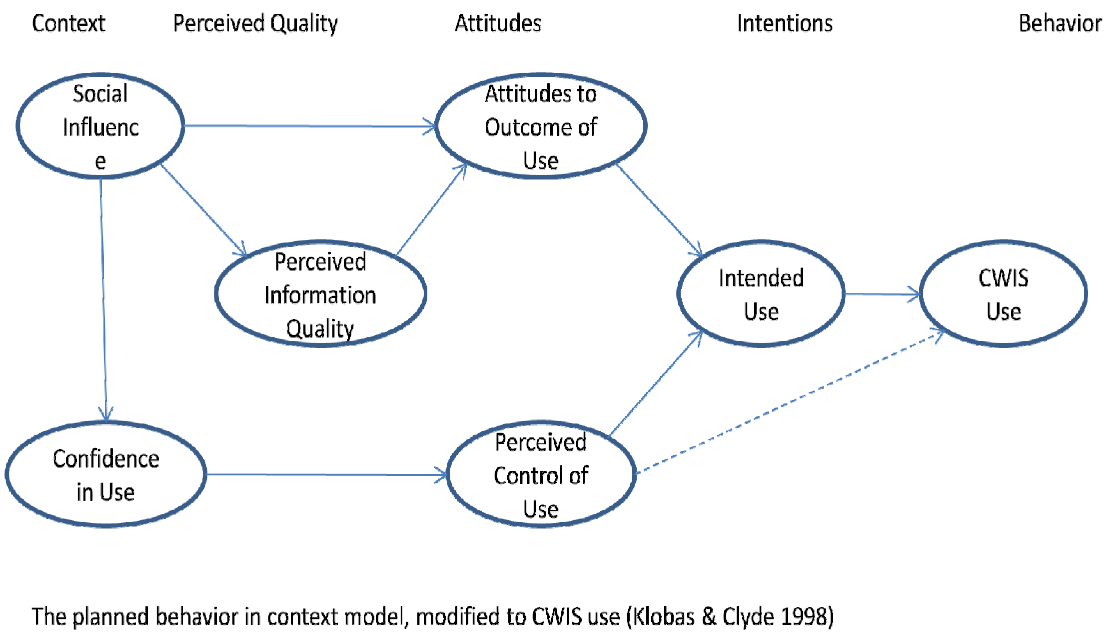

Figure 1. Planned behavior model. Source:(Klobas, J. & Clyde, L., 1998)

According to Strauss (1992) a successful CWIS must be on-line accessible from anywhere at any time. It must be usable by anyone who wants to use it; designed in such a way that users are not even aware of the software involved; containing an intuitive, user-friendly interface for a variety of platforms. It must be easy to update and maintain; having menus that are structured logically and intuitively so that users can easily find what they want; containing a heterogeneous mix of data drawn from across the university: from the community in which faculty, staff and students live, and from global sources. And it must contain enough information that is compelling and entertaining to invite people to explore and use the system.

Complexity, Organizations and CWIS

Complexity is a qualitative concept; though several attempts have been made by various researchers to provide a more or less useful and general quantitative definition, such as: algorithm complexity (sometimes called Kolmogorov complexity), computational complexity (May, 1976) or logical depth, thermodynamic depth (Palmer & Parker, 2001), and mutual information (Jost, 1998; Frederick, 1998).

According to Lagenfors, (1995, p.70) “Complexity is the property of being a thing that can only be perceived piecewise,” and, “A thing is complex when it surpasses human cognitive limitations”; (Lagenfors, 1995, p.87). Ashby (1973, p. 1) regards, “a system’s complexity [as] purely relative to a given observer” and as “something in the eye of the beholder”. Nakagawa & Yasui (1999) have defined the complexity of redundant systems as the number of paths, and entropy represents the vagueness associated with incomplete information.

The science of complexity is a broad domain that embraces chaos (Pascale, 1999). The key parameters that the new science deals with are intelligence, information processing and nonlinearity. Systems in which information and information processing ability are intrinsically embedded are intelligent CAS (Caldart & Ricart, 2004). Such intelligent systems have structure and are constantly consuming information. The intelligent dynamic aspect encompasses learning, adaptation, competition, and co-evolution with the environment (Liang, 2002).

Although the linear portion of the world is a very significant part of our existence, the remaining huge component is nonlinear. In many instances, an awareness and understanding of their similarities and differences is vital. Usually, nonlinear phenomena are not easily predictable because a slight difference in initial conditions can lead to a very dissimilar outcome, a characteristic known as the butterfly effect. Business organizations behave with nonlinearity, manifesting the characteristic of complex adaptive systems (Johnson, L. & Burton, K., 1994).

According to Bergmann (2000), the four basic assumptions underlying non-linear dynamic systems are: change is constant, emergent systems are not reducible to their parts, mutual dependence, and complex systems behave in non-proportional ways.

Every organization is tied together by information (Lagenfors, 1995). Any such information system will thus have a certain degree of complexity (Sterman, 1994; Vosburg & Kumar, 2001). A certain minimum amount of information is needed to control a process. Given the alternative characterization above, the controller will need at least, the internal variety required to represent the information to control the process. When the complexity of a process increases, the information needed to control that process increases as well (Backlund, 2002).

For CWIS some standards were developed to reduce complexity (Actis, 1995): Appropriateness: appropriate information must be defined as information that may be of general interest to members of CWIS. Currency: information providers must review and update information regularly. Accuracy and quality: documents were to be error-free in terms of spelling and grammar. Copyright: existing copyright and privacy laws must be honored. Format: standards were set for converting word-processed documents to standard format.

In a human system, complexity, and mainly emergence, tends to create irreversible structures or ideas, relationships and organizational forms; which become part of the history of individuals and institutions and in turn affect the further evolution of those entities. For example, the generation of knowledge and of innovative ideas when a CWIS designing team or a CWIS user team is working together could be described as an emergent property; in the sense that it arises from the interaction of individuals and is not just the sum of existing ideas, but could well be something quite new and possibly unexpected. Once the ideas are articulated, they form part of each individual's history and part of the shared team's history (the process is not reversible); and these new ideas and new knowledge can be built upon to generate further new ideas and knowledge.

Summary

When an organization is examined as a Complex Adaptive System (CAS) one is able to suggest that they take information from environment, and use this information to adapt themselves and change their own behavior. Two commonly observed characteristics of complex systems are a large number of interacting elements and emergent properties.

The CAS study in Organizational Theory has revealed that systems must operate far from equilibrium; where, by both negative and positive feedback, they are driven to paradoxical states of stability and instability, predictability and unpredictability.

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CHAPTER 2. Methodology and Hypothesis

Purpose

The purpose of this research is to find patterns of perception of the Campus Wide Information System novice users: perceptions regarding the interactions among them as well as of the relationship between them and CWIS during the introductory period. This research will contribute to a better understating of the intersection of Complex Adaptive Systems (CAS) and Campus Wide Information Systems by showing us how the novice users' perception affects their introduction to an unfamiliar CWIS.

The research was conducted in a private high-tech Mexican University (ranked #1 in 2005 by CUCEA (Centro Universitario de Ciencias Económico-Administrativas or University Centre of Economic and Managerial Sciences in English) Institute, ranked #5 in 2006 Latin-American University by webometrics rank an IT-based rank) with almost 17,000 students, and almost 30% of students with full or partial scholarship.

Six groups of people were selected; each group consisted of novice students (1st semester alumni) of a specialty. Students were selected from a range of skills based on each one's actual specialty. Two groups of students were taken from informatics careers, two groups from business careers, and two groups from technical non-informatics careers.

All first semester alumni have similarities: they are recent members of the organization, and they have fears and limited knowledge about the new environment, they could have similar expectations about the new relationships and the orders they have to follow. People related to informatics tend to be more open to using information technology, people related to business and administration tend to have better relationships with others, people in architecture and engineering tend to be more disciplined and have more formal mental models.

Students in technical or informatics areas have a higher degree of scholarships than business areas. Technical and informatics people tend to have greater computer usage than business people, but business people tend to have better information technology resources and services.

This research will show that rate of CWIS adoption is a relationship between some of these items: previous experience, kind of careers, self-experimentation, relationships with skill users, usage importance, quality of comments about usage, quality of comments about technical service, and degree of self-confidence.

Hypothesis

Hypothesis to test are grouped in 3 main blocks:

People's characteristics

- Previous experience: could affect (in a positive or negative way); variables related are UsoPrevio (Previous CWIS used), Expertise and Plataforma (actual CWIS used):

H_1: Students with experience with other CWIS have similar rate of CWIS adoption than the others

H_{1a}: Students with experience with other CWIS have better rate of CWIS adoption than the others

- Kind of career: could affect (in a positive or negative way), variables related are Carrera (Career), Expertise, Género (Gender), and Prepa (Highschool):

H_2: Students of different careers have similar rate of CWIS adoption

H_{2a}: Students with careers related to informatics or technical have better rate of CWIS adoption than the others

- Self-experimentation: could affect (in a positive or negative way), variables related are Tauto (Self-experimentation time), Tuso (Time connection), TarNoEnt (Homeworks not delivered), Expertise, Plataforma (actual CWIS used), Edad (Age), Género (Gender), Horario (Hours in school), and Internet (Internet connection type):

H_3: Self-experimentation does not affect the rate of CWIS adoption in students

H_{3a}: Self-experimentation affects positively the rate of CWIS adoption in students

People's relationships

- Relationships with skilled users: could affect (in a positive or negative way), variable related are: Vexp (Times of consults with experts), Namigos (Number of helper friends), Npermisma (Helper people from same career), Nperdife (Helper people from another career), Expertise, Plataforma (actual CWIS used), Edad (Age), Génro (Gender), and Prepa (Highschool):

H_4: Students with relationships with skilled CWIS users have similar rate of CWIS adoption than the others

H_{4a}: Students with relationships with skilled users of the CWIS have greater rate of CWIS adoption than the others

- Usage importance: could affect (in a positive or negative way), variables related are Imprentrega (importance given to delivery of Homework through CWIS), Tarnoentr (Homework not delivered), and Plataforma (actual CWIS used):

H_5: Usage importance does not affect the rate of CWIS adoption in students

H_{5a}: Usage importance affects the rate of CWIS adoption in students

People and CWIS relationships

- Quality of comments about usage: could affect (in a positive or negative way), variables related are Comuso (Use comments), Tfueralin (Off line total time), Plataforma (actual CWIS used), and Nfallas (Failure times):

H_6: Students believe that the quality of comments about the use of the CWIS from others does not affect their rate of CWIS adoption

H_{6a}: Students believe that the quality of comments about the use of the CWIS from others affects their rate of CWIS adoption

- Quality of comments about technical service: could affect (in a positive or negative way), variables related are Comtec (Technical service comments), Nquejas (number of Complaints), Nusuarios (Number of users), and Plataforma (actual CWIS used):

H_7: Students believe that the quality of comments from others about the CWIS technical service does not affect their rate of CWIS adoption

H_{7a}: Students believe that the quality of comments from others about the CWIS technical service affects their rate of CWIS adoption

- Confidence degree: could affect (in a positive or negative way), variables related are: Confmi (Self-trust), Facayu (Easiness for help assistance), Comuso (Use comments), Comtec (Technical service comments), Plataforma (actual CWIS used), Expertise, Social (Sociableness), Carrera (Career), Edad (Age), and Género (Gender):

H_8: Confidence degree based upon experience does not affect the rate of CWIS adoption in students

H_{8a}: Confidence degree based upon experience affects the rate of CWIS adoption in students

Hypothesis could be accommodated in five stages, Context, Perceived Quality, Attitudes, Intentions, and Behaviour (Klobas, J. & Clyde, L., 1998), as shown in Figure 2.

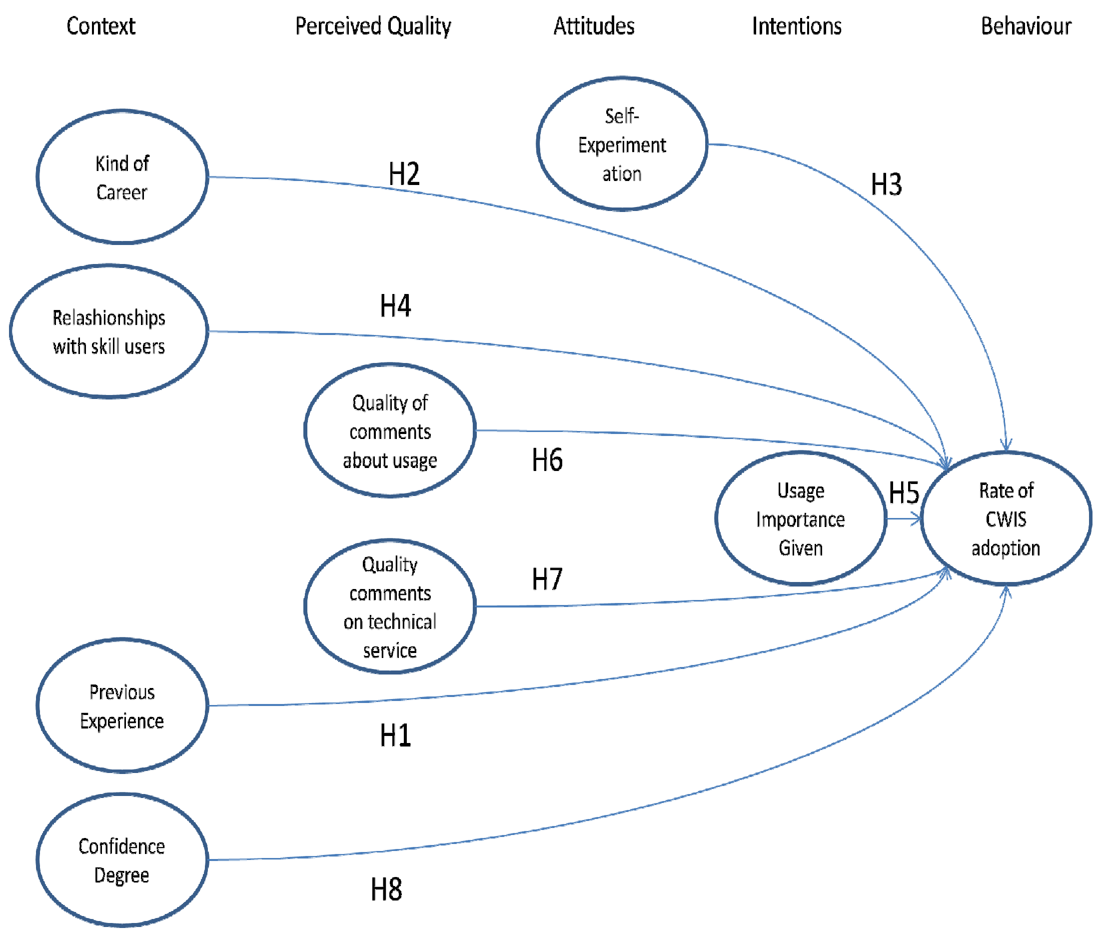

Figure 2. Model Proposed

Complexity Framework

Connectivity and Interdependence.

Complex behavior arises from the interrelationship, interaction, and interconnectivity of elements within a system and between a system and its environment (Anderson, 1999). In a human system, connectivity and interdependence mean that a decision or action by any individual in a human activity system (society, group, organization, or institution), may have an impact on related individuals and systems (Bak, 1996). That impact will not have equal or uniform effect, and will vary depending on the 'state' of each related individual and system, at the time. The 'state' of an individual or a system will include its history and its constitution, which in turn will include its organization and structure. Connectivity refers to the interrelatedness of individuals within a system, as well as to the relatedness between human social systems, it include systems of artifacts such as information technology or CWIS and intellectual systems of ideas (Ashmos, D., Huonker, J., & McDaniel, R., 1998). In CWIS management the man-machine interface is part of that interconnectivity, as well as the requirements to integrate different information technology systems (Connolly, 1999).

Complexity theory does not postulate the need for an ever-increasing connectivity, since high connectivity implies a high degree of interdependence. This means that the greater the interdependence between related systems or entities, the wider the 'ripples' of perturbation or disturbance from a move or action by any entity on all the other related entities (Helfer, 1998). A high degree of interdependence may not always have beneficial effects throughout the system. When one entity tries to improve its position, this may result in a worsening condition for others. Each 'improvement' in one entity therefore, may impose associated 'costs' on other entities, either within the same system or on other related systems. As every software engineer knows, non-intended interdependence in CWIS, in large complicated systems, is often responsible for unexpected consequences when systems are updated or enhanced (Laudon, K. & Laudon, J., 2004).

Intense interconnectivity creates multiple and intricate dependencies throughout the system, which cannot be pulled apart. Hence complexity theory suggests that outcomes are often non-deterministic (Stacey, 1995). As any software engineer knows, interdependence plays an important role in large IT systems, which become apparent when one part is changed; this results in unforeseen and often significant effects in other parts of the system (Sterman, 2000).

Hypothesis related to Connectivity and Interdependence:

H_4: Students with relationships with skilled CWIS users have similar rate of CWIS adoption than the others

H_5: Usage importance does not affect the rate of CWIS adoption in students

H_6: Students believe that the quality of comments about the use of the CWIS from others does not affect their rate of CWIS adoption

H_7: Students believe that the quality of comments from others about the CWIS technical service does not affect their rate of CWIS adoption

H_8: Confidence degree based upon experience does not affect the rate of CWIS adoption in students

Co-evolution.

Connectivity applies not only to elements within a system but also to related systems within an ecosystem. In biology, as entities and organisms interact and adapt within an ecosystem they alter "both the fitness and the fitness landscape of the other organisms" (Kauffman, 1995). In an ecosystem, the way each element influences and is in turn influenced by all other related elements is part of the process of coevolution, which Kauffman describes as "a process of coupled, deforming landscapes where the adaptive moves of each entity alter the landscapes of its neighbors." (Kauffman, S. & Macready, W., 1995)

Another way of describing co-evolution is that the evolution of one domain or entity is partially dependent on the evolution of other related domains or entities (Santosus, 1998); or that one domain or entity changes in the context of the others.

Hypothesis related to Co-Evolution:

H_6: Students believe that the quality of comments about the use of the CWIS from others does not affect their rate of CWIS adoption

H_7: Students believe that the quality of comments from others about the CWIS technical service does not affect their rate of CWIS adoption

Far-from-equilibrium.

Another key concept in complexity is that of ‘far-from-equilibrium’. When open systems are pushed ‘far-from-equilibrium’, they are able to create new structures and order. Originally, it applied to physical and chemical systems, but it was of such significance in explaining complex behavior that the concept has been adopted in other fields (Levy, 1994). In a social context, ‘far-from-equilibrium’ means moving away from established norms, procedures and ways of working and relating (Fitzgerald, L., & Eijnatten, F., 2002).

An observer cannot predict which state will emerge; “only chance will decide, through the dynamics of fluctuations. The system will, in effect, scan the territory and will make a few attempts, perhaps unsuccessful at first, to stabilize. Then a particular fluctuation will take over. By stabilizing it, the system becomes a historical object in the sense that its subsequent evolution depends on this critical choice.” (Nakagawa, T. & Yasui, K., 1999)

Hypothesis related to Far-from-Equilibrium:

H_1: Students with experience with other CWIS have similar rate of CWIS adoption than the others

H_2: Students of different careers have similar rate of CWIS adoption

H_4: Students with relationships with skilled CWIS users have similar rate of CWIS adoption than the others

H_5: Usage importance does not affect the rate of CWIS adoption in students

H_8: Confidence degree based upon experience does not affect the rate of CWIS adoption in students

Self-organization, Emergence and the Creation of new Order.

Kauffman in the 'Origins of Order: Self-Organization and Selection' (1993), brings the importance of self-organization in the evolutionary process. He calls Darwinian natural selection a "single singular force" and argues that, "It is this single-force view which I believe to be inadequate, for it fails to notice, fails to stress, and fails to incorporate the possibility that simple and complex systems exhibit order spontaneously." (Kauffman, 1993) That spontaneous order is self-organization: he argues that natural selection is not the sole source of order in organisms and suggests that both natural selection and self-organization are necessary for evolution; he then proceeds to expand evolutionary theory to incorporate both evolutionary forces.

Emergent properties, qualities, patterns, or structures, arise from the interaction of individual elements. They are structures or patterns that appear at the next macro level as a result of interaction at a lower micro level. The relationship between the micro-events and macro-structures is iterative. It is a co-evolutionary process whereby, through their interaction, the individual entities and the macro-structures create influence on each other in an ongoing iterative process. Emergence is the process that creates new order together with self-organization.

In an organizational context, self-organization may be described as the spontaneous coming together of a group to perform a task (or for some other purpose); the group decides what to do, how and when to do it; and no one outside the group directs those activities (Bak, 1996).

Emergence in a human system tends to create irreversible structures or ideas, relationships and organizational forms, which become part of the history of individuals and institutions and in turn affect the further evolution of those entities (Frederick, 1998).

Hypothesis related to Self-Organization:

H_3: Self-experimentation does not affect rate of CWIS adoption in students

H_4: Students with relationships with skilled CWIS users have similar rate of CWIS adoption than the others

H_6: Students believe that the quality of comments about the use of the CWIS from others does not affect their rate of CWIS adoption

H_7: Students believe that the quality of comments from others about the CWIS technical service does not affect their rate of CWIS adoption

H_8: Confidence degree based upon experience does not affect the rate of CWIS adoption in students

Methodology

This was a survey study. First, the survey was designed and sent to 9 experts in CWIS (3), Information Systems Design (2), Complexity Theory (1) and Education (3) with the purpose of performing content validity, and logical validity. These experts were selected based on their background and related fields to the study (Davis, 1992). The number of experts was set it up by the volunteers granted; Lynn (1986) suggested minimum of three, but others (Walz, C., Strickland, O. & Lenz, E., 1991) have suggested a range from 2 to 20 experts. Grant & Davis (1997) noted the number of experts depends on the desired level of expertise and diversity of knowledge.

After the items were evaluated in content validity by the experts and corrections were made, one face validity (McGarland, D., Berg-Weger, M., Tebb, S., Lee, E. & Rauch, S., 2003) was set up with 32 first-semester students from an introductory course. Some details were corrected.

Data was collected by an anonymous survey sent via e-mail. Questions were asked in three different ways, in Spanish: neutral, positive, and negative way (i.e. “My kind of career does not affect my adoption velocity of a CWIS”, “My kind of career helps me to accelerate my adoption velocity of a CWIS”, and “My kind of career negatively affect my adoption velocity of a CWIS”).

Two pilot tests were implemented; first, one showed some problems with neutral questions and misunderstanding, for this, 32 students were asked about the test (face validity). More explanation was added, neutral questioning was deleted and an improved version of the survey was applied to a new 36 students. They reported no problems to understand the survey.

Finally survey was sent to a 214 first-semester students; an incentive was set up (movie tickets were gifted), and 175 respond the survey. The survey showed a good correlation between positive and negative questions (Table 1). Positive questions were selected and values over 3 were set up to 3, then only values 1, 2 and 3 were used.

Correlation matrix (Pearson):

Variables	ExpN	CarrN	AutoN	RelN	ImpN	UsoN	TecN	ConfN
ExpP	-0.836	-0.099	-0.108	-0.223	-0.240	-0.322	-0.127	-0.303
CarrP	-0.126	-0.600	-0.113	-0.305	-0.092	-0.338	-0.364	-0.210
AutoP	-0.106	-0.217	-0.766	-0.155	-0.288	-0.028	-0.153	-0.285
RelP	-0.176	-0.331	-0.222	-0.554	-0.215	-0.235	-0.252	-0.337
ImpP	-0.214	0.038	-0.062	-0.090	-0.724	-0.083	-0.071	0.025
UsoP	-0.272	-0.282	-0.005	-0.050	-0.123	-0.695	-0.093	-0.084
TecP	-0.164	-0.209	-0.192	-0.199	-0.197	-0.140	-0.808	-0.297
ConfP	-0.372	-0.199	-0.228	-0.376	-0.317	-0.084	-0.266	-0.566

Values in bold are significantly different from 0 with a significance level alpha=0.05

Table 1. Correlations between positive and negative questions

CHAPTER 3. Results

Results

The targeted population (Table 2) was students in first semester from six careers (two informatics careers, two business careers and two technical careers), the total size was of 214 (N). With a 99% confident level and 5% interval level the sample size must be 160.

Stratus	Population Size	Sample Size	Surveys collected
ITC (Informatics)	44	33	36
ITE (Informatics)	35	26	29
IQS (Technical)	17	12	14
IME (Technical)	32	24	26
LEC (Business/Management)	42	32	34
LRI (Business/Management)	44	33	36
TOTAL	214	160	175

Table 2. Population and Sample size

Survey Responses

Students answer 36 questions about things they perceived as improving or reducing their rate of CWIS adoption. Eight questions were formulated in a positive form, asking about what things help them to accelerate their rate of CWIS adoption; the last eight questions were formulated in negative form, asking about what things decreased their rate of CWIS adoption.

Questions were about three topics:

People’s characteristics: experience with others CWIS (EXP), type of student’s career (CARR), and self-experimentation with CWIS (AUTO).

People’s relationships: Relationships with experienced CWIS users (REL), and usage importance given to the CWIS (IMP).

People and CWIS relationships: quality of comments on CWIS usage (USO), quality of comments on CWIS technical support (TEC), and self-confidence degree on CWIS usage (CONF).

Students used a Likert’s scale from 1 to 7 to answer, where 1 means “agree” and 7 “disagree”. The next synoptic table (Table 3) shows the results:

	Exp P	Carr P	Auto P	Rel P	Imp P	Uso P	Tec P	Conf P	Exp N	Carr N	Auto N	Rel N	Imp N	Uso N	Tec N	Conf N
1	112	94	120	92	99	67	60	103	2	0	0	0	0	0	0	0
2	48	56	42	60	60	64	64	62	1	1	0	0	0	3	3	0
3	10	23	13	22	10	35	44	10	1	1	0	0	2	8	0	2
4	1	1	1	1	6	4	5	1	3	3	3	5	10	8	5	11
5	2	0	0	1	1	1	0	0	10	18	11	22	13	38	29	13
6	1	2	0	0	0	5	3	0	59	57	37	51	58	53	69	49
7	2	0	0	0	0	0	0	0	100	96	125	98	93	66	70	101
	176	176	176	176	176	176	176	176	176	176	176	176	176	176	176	176

Table 3. Results on rate of CWIS adoption

Answers from 4 to 7 were aggregated to value 3 to fall into positive form answers, and responses 1 to 4 were aggregated to value 5 in negative form answers to simplify the statistical analysis. After this aggregated action, data (Table 4) ends in this way.

	Exp P	Carr P	Auto P	Rel P	Imp P	Uso P	Tec P	Conf P	Exp N	Carr N	Auto N	Rel N	Imp N	Uso N	Tec N	Conf N
1	112	94	120	92	99	67	60	103	0	0	0	0	0	0	0	0
2	48	56	42	60	60	64	64	62	0	0	0	0	0	0	0	0
3	16	26	14	24	17	45	52	11	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	17	23	14	27	25	57	37	26
6	0	0	0	0	0	0	0	0	59	57	37	51	58	53	69	49
7	0	0	0	0	0	0	0	0	100	96	125	98	93	66	70	101
	176	176	176	176	176	176	176	176	176	176	176	176	176	176	176	176

Table 4. Results on rate of CWIS adoption (simplified)

Sample demographics (Table 5) were labeled in this way:

Siglas (Career ID)	1	ITC (Informatics: Bachelor in Computer Technology)
		ITE (Informatics: Bachelor in Electronic Technology)
	2	IQS (Technical: Bachelor in Chemistry and Information Systems)
		IME (Technical: Bachelor in Electromechanics)
	3	LEC (Business: Bachelor in Economy)
		LRI (Business: Bachelor in International Relationships)

Table 5. Sample demographics

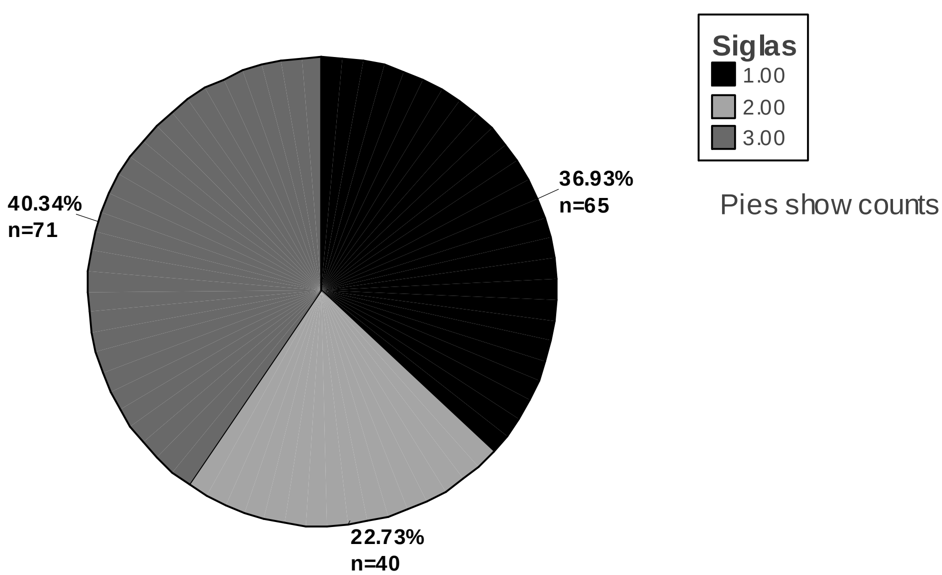

Figure 3. Career ID

Edad (Age)	1	18 or less
	2	19 to 20
	3	21 or older

Table 6. Age

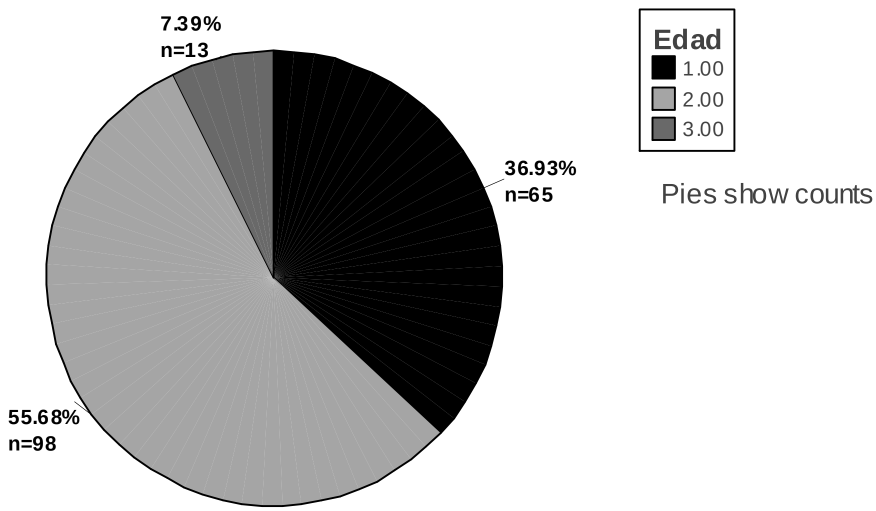

Figure 4. Age

Género (Gender)	1	Male
	2	Female

Table 7. Gender

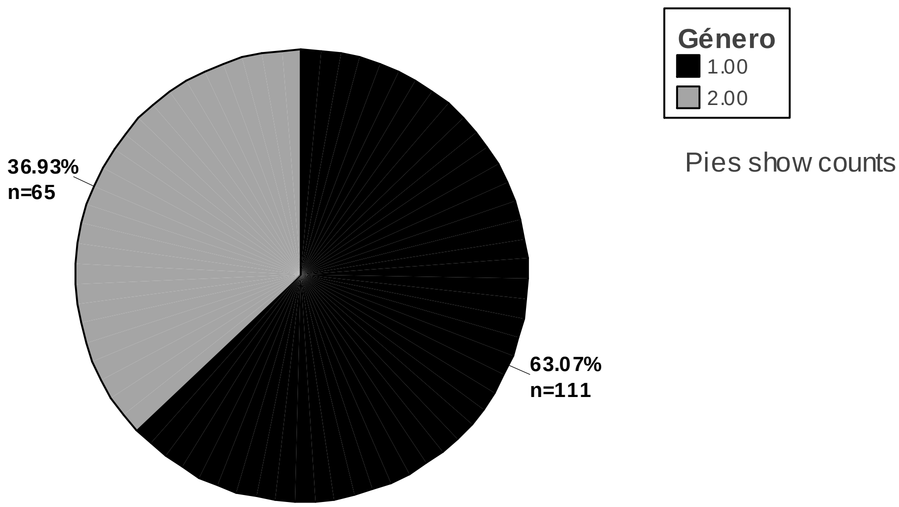

Figure 5. Gender

Procedencia (From)	1	In State
	2	Out of State

Table 8. From

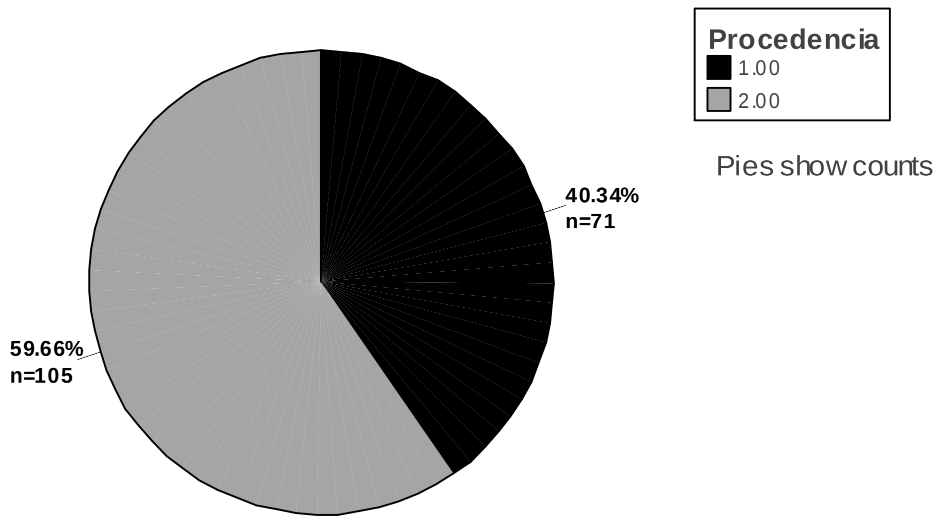

Figure 6. From

Becado (Scholarship)	1	Yes
	0	No

Table 9. Scholarship

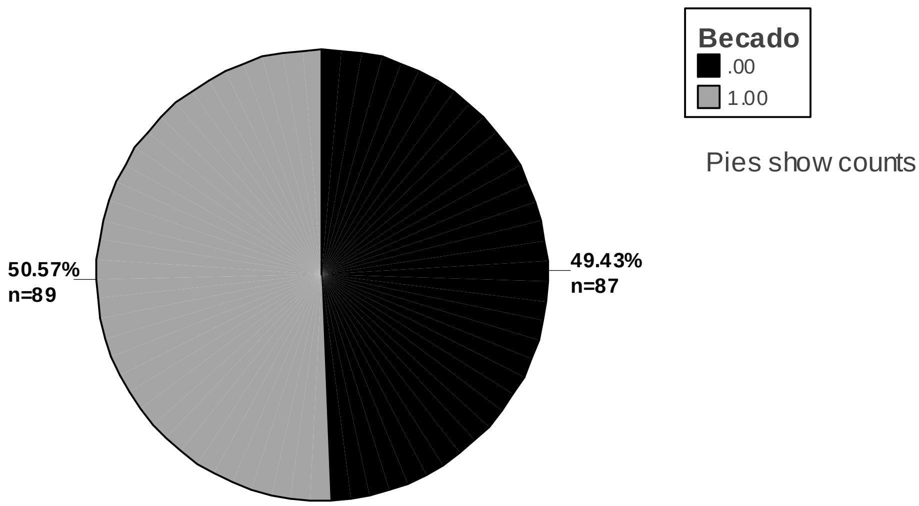

Figure 7. Scholarship

Trabajo (Working status)	0	No
	1	Half
	2	Full

Table 10. Working Status

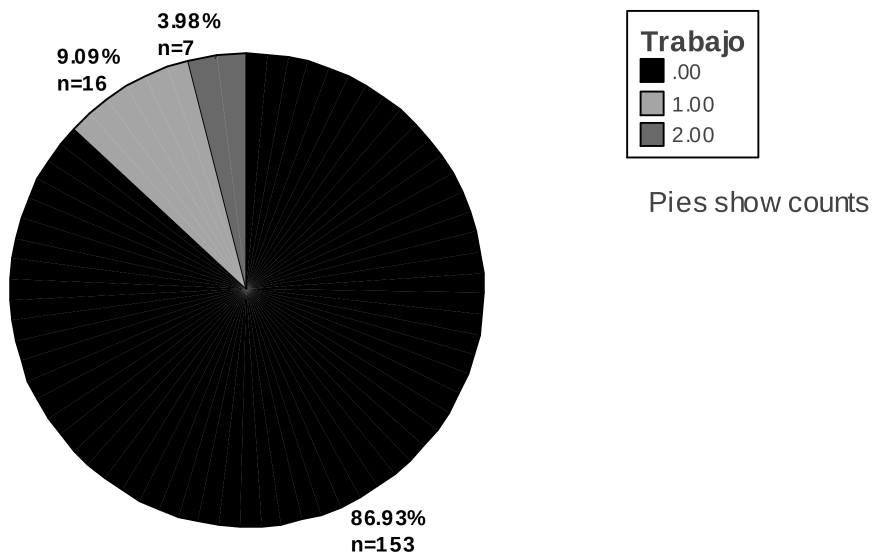

Figure 8. Working Status

Prepa (Highschool)	0	Public
	1	Private

Table 11. Highschool

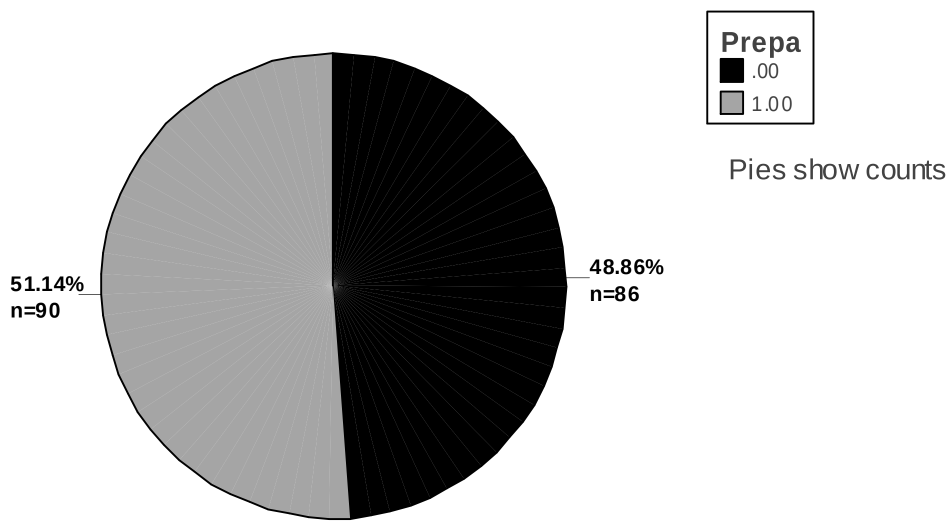

Figure 9. Highschool

Internet	0	No
	1	Phone
	2	Wide

Table 12. Internet connection

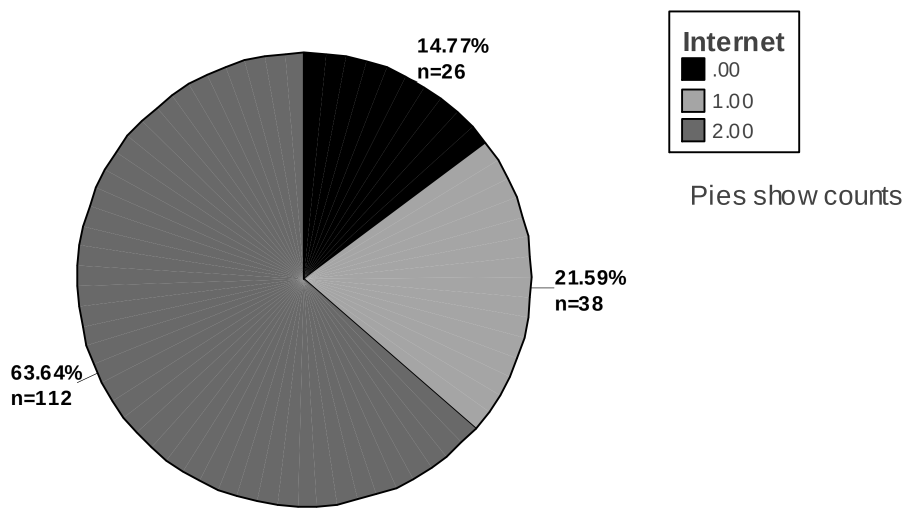

Figure 10. Internet connection

Horario (Hours between classes)	0	No hours
	1	1-4 hours
	2	5 or more hours

Table 13. Hours between Classes

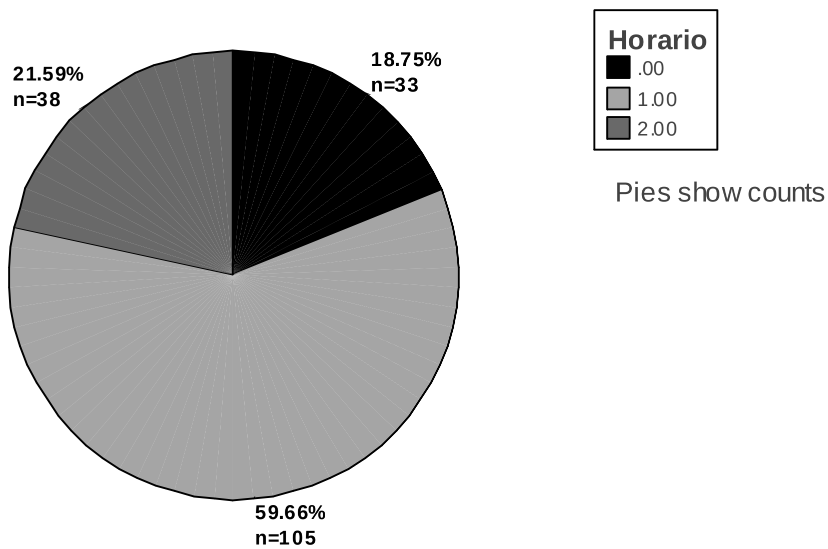

Figure 11. Hours between Classes

Carrera (Career student's perception)	1	Informatics
	2	Technical
	3	Business

Table 14. Career Student's Perception

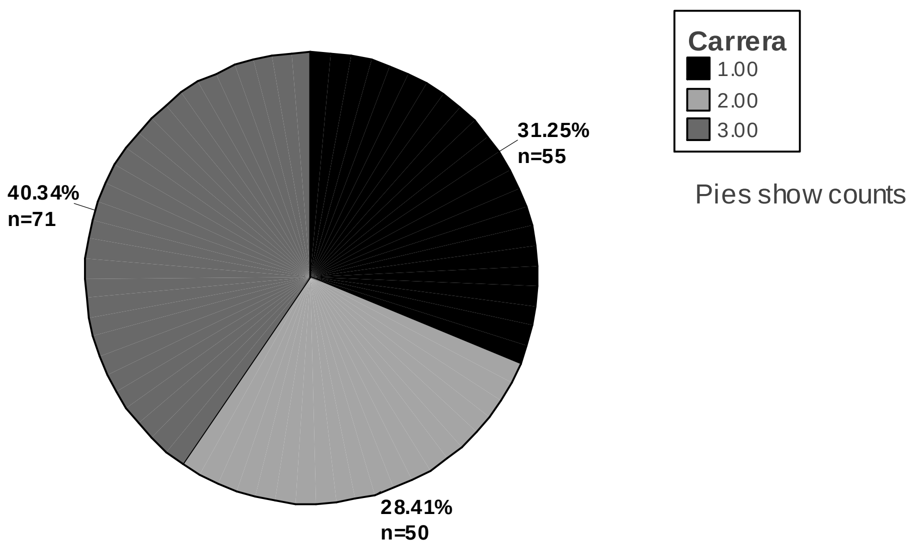

Figure 12. Career Student's Perception

Social (Socialship)	0	Low sociable
	1	Medium sociable
	2	High sociable

Table 15. Socialship

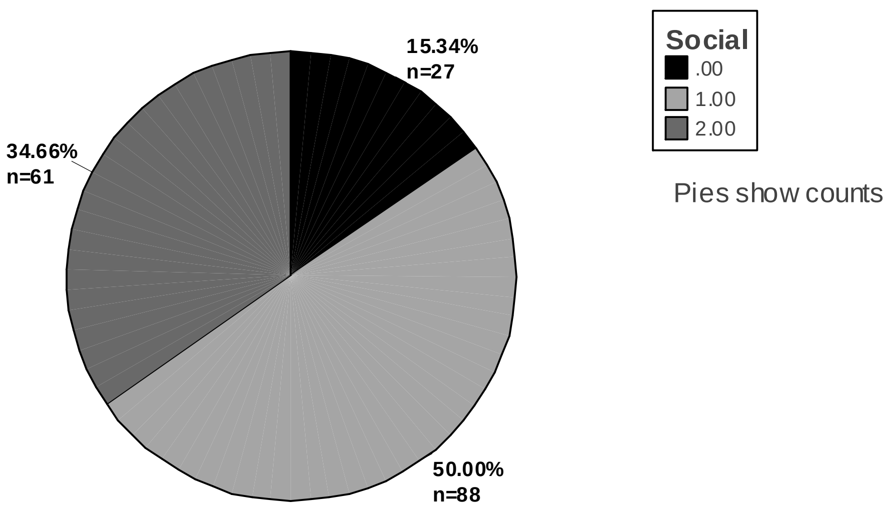

Figure 13. Socialship

Correlations between Independent variables

Correlations show several relationships between these demographic variables. Correlations magnitudes are large (values between -1 to -0.5 and 1 to 0.5), medium (values between -0.5 to -0.3 and 0.5 to 0.3), and small (values between -0.3 to -0.1

and 0.3 to 0.1). Those values are valid in social sciences studies with complex factors (Cohen, 1988).

Correlations with Age.

Expected correlations:

- (0.320 - Medium Correlation) Importance of homework delivery through CWIS. Older students gave more importance to deliver homework through CWIS. Probably they are more mature students and understand the importance of doing their homework.
- (0.312 - Medium Correlation) Actual CWIS used. Older students are in administrative careers and they use Blackboard, younger students are in informatics and technical careers, and use Webtec.

Non-expected correlation:

- (0.345 - Medium Correlation) Career. Informatics and technical career students are younger than business students. Probably informatics and technical career students are faster and finished their high school studies earlier.

Correlations with Gender.

Expected correlation:

- (0.319 - Medium Correlation) Career. Informatics and technical careers have more men, and business careers have more women. Probably men are more attracted to abstract knowledge.

Correlations with Scholarship.

Expected correlations:

- (-0.319 - Medium Correlation) Actual CWIS used. Scholarships students tend to use Webtec, non scholarship students tend to use Blackboard. Most scholarship students are in informatics and technical careers and they use Webtec.
- (-0.301 - Medium Correlation) Amount of expert advices. Scholarship students tend to ask experts less than non scholarship students, who tend to ask more to the experts. This is probably because most scholarship students are in informatics and technical careers and they do not ask, or ask only a few times to the experts.

Correlations with Highschool.

Expected correlation:

- (0.750 - Large Correlation) Another CWIS used. Students from private schools have more experience with other CWIS. This is probably because most private schools have CWIS installed; public schools have fewer resources in Mexico and probably do not have currently a CWIS.

Correlations with Internet Connection.

Expected correlations:

- (0.421 - Medium Correlation) Help assistance. Students with better internet connections find help easier than students with poor internet connections. This is probably because technology favors people with better internet connections.
- (0.412 - Medium Correlation) Importance of homework delivery through CWIS. Students with better internet connections tend to give more importance to deliver homework through the CWIS. This is probably because they have more technology of their side.
- (0.347 - Medium Correlation) Actual CWIS used. Students with better internet connections are in business careers and use Blackboard.
- (-0.317 - Medium Correlation) Connection time. People with better internet connections have less connection time than.people with poor internet connection. This is probably because students need more time to accomplish their homework if they have poor internet connection.

Non-expected correlation:

- (0.421 - Medium Correlation) Career. Business students have better internet connections than informatics and technical students. This is probably because business students are wealthier than informatics and technical students; also, business students have more women and probably they have less probability (in Mexico) of getting a good internet connection outside their house.

Correlations with Career.

Expected correlations:

- (0.617 - Large Correlation) Self-confidence. Students from business careers tend to be less self-confident than students from informatics and technical careers. This is probably because people from informatics and technical careers feel more in control of technology.
- (0.740 - Large Correlation) Help Assistance. Students from business careers tend to search for more help assistance than informatics and technical careers. This is probably because people from informatics and technical careers feels less anxiety using CWIS.
- (0.535 - Large Correlation) Number of helper friends. Students from business careers tend to ask more friends about the CWIS. Probably because people from informatics and technical careers try to do their work by them-selves.
- (-0.488 - Medium Correlation) Failure times. Students from business careers report less falters of the CWIS. This is probably because people from business careers use less the CWIS than informatics and technical careers.
- (-0.425 - Medium Correlation) Other career helper people. Students tend to ask more to same-career students. This is probably because they feel better with same career students.

- (0.901 - Large Correlation) Actual CWIS used. Students from informatics use Webtec and students from business use Blackboard.
- (-0.560 - Large Correlation) Self-experimentation time. Students from informatics and technical careers tend to have more self-experimentation time than students from business careers. This is probably because informatics and technical students have the tendency to investigate functions or weakness in CWIS.
- (-0.738 - Large Correlation) Connection time. Students from informatics and technical careers tend to have more time connection to the CWIS than business students. This is probably because informatics and technical students have more self-experimentation time.
- (0.539 - Large Correlation) Amount of expert advices. Students from business careers tend to ask more to experts than informatics and technical people. This is probably because business students have less self-experimentation time.

Non-expected correlations:

- (0.885 - Large Correlation) Importance of homework delivery through the CWIS. Students from business careers tend to give more importance to deliver their homework than informatics and technical careers through the system. This is probably because people from business careers are more mature.
- (0.505 - Large Correlation) Homework not delivered. Students from business careers tend to deliver less homework than informatics and technical careers.

Even though business people give more importance to deliver their homework using CWIS, probably they have less skill in CWIS usage and therefore deliver less homework than informatics and technical students.

Correlations with Socialship.

Expected correlations:

- (0.470 - Medium Correlation) Number of helper friends. Students with more social skills have more friends than students with less social skills.
- (0.360 - Medium Correlation) Other career helper persons. Students with more social skills ask more to other career students.
- (0.351 - Medium Correlation) Amount of expert advices. Students with more social skills ask more to experts. Probably they feel more comfortable due to their social skills.

Correlations with Self-Confidence.

Expected correlations:

- (0.504 – Large Correlation) Importance of homework delivery through the CWIS. Students with a high degree of self-confidence tend to give more importance to deliver their homework through the CWIS. This is probably because they have enough control over the CWIS and try to accomplish all their homework.
- (-0.395 – Medium Correlation) Failure times. Students with a high degree of self-confidence report more failures in CWIS usage. This is probably because

they cause more errors to the CWIS due to the confidence given by their knowledge.

- (-0.395 – Medium Correlation) Actual CWIS used. Webtec tend to give more self-confidence to its user than Blackboard; this is probably because Webtec is simpler.
- (0.445 – Medium Correlation) Homework not delivered. High confidence level students tend to deliver more homework than low confidence level students.
- (-0.624 – Large Correlation) Self-experimentation time. High confidence level students tend to have more self-experimentation time than low confidence level students.
- (-0.634 – Large Correlation) Connection time. High confidence level students tend to stay more time in line than low confidence level students.
- (0.634 – Large Correlation) Amount of expert advices. High confidence level students ask less to experts than low confidence level students.

Non-expected correlations:

- (0.470 - Medium Correlation) Help assistance. Students with a high degree of self-confidence finds help assistance easier than non self-confidence students. This is probably because self-confidence students understand the CWIS in a better way and know who to ask when needing assistance.

- (-0.348 – Medium Correlation) Other career helper people. Students with a high degree of self-confidence tend to ask more for help to other career people. They probably feel that same career students have the same knowledge, so they try to find different answers to their questioning.

Correlations with Expertise.

Expected correlations:

- (-0.375 – Medium Correlation) Other career helper people. Students with low expertise level tend to ask more to students of other careers than students with high expertise level.
- (-0.364 – Medium Correlation) Same career helper people. Students with low expertise level tend to ask more to students of same careers than students with high expertise level. Higher expertise level students ask to nobody.

Correlations with Help Assistance.

Expected correlations:

- (0.874 – Large Correlation) Importance of homework delivery trough the CWIS. Students who looks for help assistance in CWIS usage tend to give more importance to the delivery of homework trough the CWIS. Probably they look for assistance to deliver their homework.
- (0.352 – Medium Correlation) Number of helper friends. Students who look for help assistance have more helper friends than students who do not look for help assistance.

- (0.654 – Large Correlation). Actual CWIS used. More Blackboard users look for help assistance versus Webtec users. This is probably because Blackboard is a complex product.
- (-0.349 – Medium Correlation). Self-experimentation time. A person who looks for help assistance tends to have less self-experimentation time. Self-experimentation time probably helps students and skilled students to not have to look for help assistance.
- (-0.498 – Medium Correlation). Connection time. A person who looks for help assistance tends to have less connection time. This is probably because they do not invest time in self-experimentation.
- (0.380 – Medium Correlation). Amount of expert advices. A person who looks for help assistance tends to ask more to the experts. Probably because they know experts can help them.

Non-expected correlation:

- (0.352 – Medium Correlation) Homework not delivered. A student who looks for help assistance for CWIS usage tends to deliver less homework. They probably look for assistance to deliver their homework and finally they have too much problems and do not deliver their homework.

Correlations with Homework through CWIS delivery importance.

Expected correlations:

- (0.440 – Medium Correlation). Number of helper friends. People who give more importance to homework delivery though the CWIS tend to have more helper friends. They probably have someone to ask in problem situations.
- (0.381 – Medium Correlation). Failure times. People who give more importance to homework delivery though the CWIS tend to report more failures. This is probably because they have more time connection.
- (-0.379 – Medium Correlation). Other career helper people. People who give more importance to homework delivery though the CWIS tend to avoid ask for help to other career students. They probably have little confidence in them.
- (0.317 – Medium Correlation). Same career helper people. People who give more importance to homework delivery through the CWIS tend to ask same career students for help. They probably have more confidence them.
- (0.468 – Medium Correlation). Amount of expert advices. People who give more importance to homework delivery though the CWIS tend to ask experts for help. Probably they have more confidence in them.

Non-expected correlations:

- (0.793 – Large Correlation). Actual CWIS used. Blackboard users tend to give more importance to homework delivery through the CWIS than Webtec users.

Blackboard users probably have more pressure to deliver their homework due to their low skills.

- (0.427 – Medium Correlation). Homework not delivered. Blackboard users tend to deliver less homework than Webtec users. This is probably because Blackboard users have low CWIS skills.
- (-0.468 – Medium Correlation). Self-experimentation time. Blackboard users tend to have less self-experimentation time than Webtec users. This is probably because Webtec users have high CWIS skills.
- (-0.649 – Large Correlation). Connection time. Blackboard users tend to have less connection time than Webtec users. This is probably because Webtec users tend to do more self-experimentation even they give less importance to deliver homework through CWIS.

Correlations with Number of helper friends.

Expected correlations:

- (0.439 – Medium Correlation). Actual CWIS used. Blackboard users tend to have more helper friends than Webtec users. This is probably because business people are more sociable than informatics and technical people.
- (-0.322 – Medium Correlation). Self-experimentation time. Blackboard users tend to have less experimentation time than Webtec users. This is probably because business people tend to ask more to their friends rather than practicing CWIS self-experimentation.

- (-0.413 – Medium Correlation). Connection time. Blackboard users tend to have less connection time than Webtec users. This is probably because business people tend to ask more to their friends rather thanprac ticing CWIS self-experimentation.

Correlations with Failure times.

Expected correlations:

- (-0.460 – Medium Correlation). Actual CWIS used. Webtec had more failure times than Blackboard. This information was obtained from logs.
- (0.511 – Large Correlation). Self-experimentation time. People with more self-experimentation time reports higher failure times.
- (0.581 – Large Correlation). Time connection. People with grater connection time reports higher failure times.

Non-expected correlation:

- (-0.308 – Medium Correlation). Homework not delivered. Blackboard users tend to deliver less homework than Webtec users. Even though Webtec has more failure times, people delivered more homework due its simplicity.
- (-0.335 – Medium Correlation). Amount of expert advices. Students who reported more failure times tend to avoid asking experts. This is probably because students with more connection time are skilled and do not need consulting with experts.

Correlations with Other career helper friends.

Non-expected correlations:

- (-0.455 – Medium Correlation). Actual CWIS used. Blackboard users avoid asking for help assistance to other career helper friends. This is probably they avoid other careers people due to lack of confidence in them.
- (0.336 – Medium Correlation). Connection time. Students who ask for help to other career friends have higher connection time. They probably need more time connection while asking for help assistance.

Correlations with Same career helper friends.

Expected correlation:

- (-0.326 – Medium Correlation). Self-experimentation time. People who ask for help to same career helper friends have less self-experimentation time. They probably save time by asking their same career friends.

ANOVA analysis and Regression analysis

Using ANOVA analysis (Univariate analysis of variance), the following results was obtained.

H_1: Students with experience with other CWIS have similar rate of CWIS adoption than the others (ExpP)

Between-Subjects Factors

		N
Expertise	1	45
	2	88
	3	43
Another cwis used	0	84
	1	92
CWIS name (0-webtec, 1-BB)	0	65
	1	111

Table 16. Between-subjects factors – Previous experience helps? (ExpP)

Tests of Between-Subjects Effects

Dependent Variable: Previous experience helps?

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	10.416(a)	11	.947	2.381	.009
Intercept	264.711	1	264.711	665.631	.000
Expertise	1.529	2	.765	1.923	.149
UsoPrevio	.181	1	.181	.456	.501
Plataforma	3.376	1	3.376	8.488	.004
Expertise * UsoPrevio	.296	2	.148	.373	.690
Expertise * Plataforma	.498	2	.249	.627	.536
UsoPrevio * Plataforma	.021	1	.021	.054	.817
Expertise * UsoPrevio * Plataforma	2.933	2	1.466	3.687	.027
Error	65.220	164	.398		
Total	448.000	176			
Corrected Total	75.636	175			

a R Squared =.138 (Adjusted R Squared =.080)

Table 17. Tests of Between-Subjects Effects - Previous experience helps? (ExpP)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.289[a]	.083	.067	.635	.083	5.221	3	172	.002

a. Predictors: (Constant), CWIS name (0-webtec, 1-BB), Another cwis used, Expertise

Table 18. Model Summary (ExpP)

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.313	3	2.104	5.221	.002(a)
	Residual	69.324	172	.403		
	Total	75.636	175			

a Predictors: (Constant), CWIS name (0-webtec, 1-BB), Another cwis used, Expertise
b Dependent Variable: Previous experience helps?

Table 19. ANOVA (ExpP)

Correlation matrix:

Variables	UsoPrevio	Expertise	Plataforma	ExpP
UsoPrevio	**1.000**	-0.064	0.117	-0.066
Expertise	-0.064	**1.000**	-0.179	-0.160
Plataforma	0.117	-0.179	**1.000**	0.243
ExpP	-0.066	-0.160	0.243	**1.000**

Table 20. Correlation matrix (ExpP)

Summary of the variables selection:

No. of variables	Variables	MSE	R^2	Adjusted R^2	Mallows' Cp	Akaike's AIC
2	Expertise /	0.405	0.073	0.057	3.904	-156.040
3	UsoPrevio	**0.403**	0.083	0.067	4.000	-155.978

The best model for the selected selection criterion is displayed in blue

Table 21. Variable selection (ExpP)

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	3	6.313	2.104	5.221	0.002
Error	172	69.324	0.403		
Corrected Total	175	75.636			

Computed against model Y=Mean(Y)

Model parameters:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	1.556	0.175	8.893	< 0.0001	1.211	1.901
UsoPrevio	-0.133	0.097	-1.380	0.169	-0.324	0.057
Expertise	-0.116	0.069	-1.687	0.093	-0.252	0.020
Plataforma	0.316	0.101	3.119	0.002	0.116	0.516

Equation of the model:

ExpP = 1.556-0.133*UsoPrevio-0.116*Expertise+0.316*Plataforma

Standardized coefficients:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
UsoPrevio	-0.102	0.074	-1.380	0.169	-0.247	0.044
Expertise	-0.125	0.074	-1.687	0.093	-0.272	0.021
Plataforma	0.233	0.075	3.119	0.002	0.085	0.380

Table 22. Analysis of variance and Equation of the model

(ExpP)

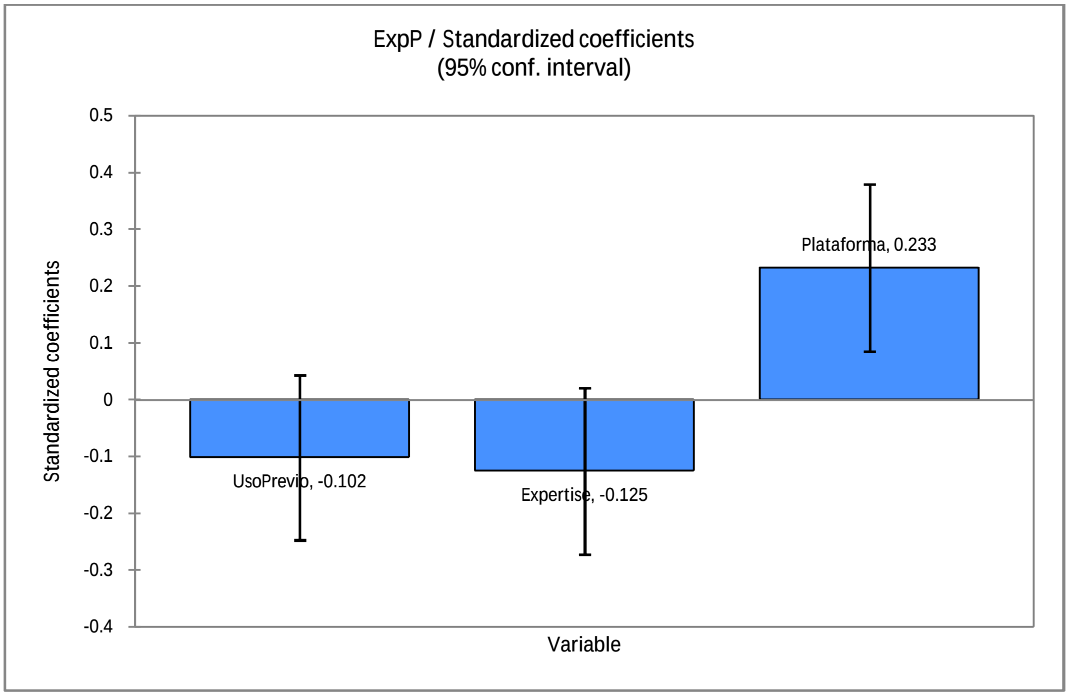

Figure 14. Standardized coefficients (ExpP)

H_2: Students of different careers have similar rate of CWIS adoption (CarrP)

Between-Subjects Factors

		N
Expertise	1	45
	2	88
	3	43
Career	1	65
	2	40
	3	71
Gender	1	111
	2	65
High School	0	86
	1	90

Table 23. Between-subjects factors - Career helps? (CarrP)

Tests of Between-Subjects Effects

Dependent Variable: Career helps?

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	31.054(a)	31	1.002	2.302	.001
Intercept	196.945	1	196.945	452.505	.000
Expertise	.298	2	.149	.342	.711
Carrera	13.904	2	6.952	15.973	.000
Género	.137	1	.137	.315	.575
Prepa	.001	1	.001	.003	.953
Expertise * Carrera	1.370	4	.343	.787	.535
Expertise * Género	.696	2	.348	.799	.452
Carrera * Género	1.795	2	.898	2.063	.131
Expertise * Carrera * Género	.519	3	.173	.398	.755
Expertise * Prepa	3.389	2	1.694	3.893	.023
Carrera * Prepa	1.187	2	.594	1.364	.259
Expertise * Carrera * Prepa	4.625	4	1.156	2.656	.035
Género * Prepa	.079	1	.079	.181	.671
Expertise * Género * Prepa	1.122	2	.561	1.289	.279
Carrera * Género * Prepa	1.889	2	.944	2.170	.118
Expertise * Carrera * Género * Prepa	.240	1	.240	.552	.459
Error	62.674	144	.435		
Total	552.000	176			
Corrected Total	93.727	175			

a R Squared =.331 (Adjusted R Squared =.187)

Table 24. Tests of Between-Subjects Effects - Career helps?

(CarrP)

Model Summary

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.337[a]	.113	.098	.695	.113	7.338	3	172	.000

a. Predictors: (Constant), High School, Expertise, Career

Table 25.. Model Summary (CarrP)

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.635	3	3.545	7.338	.000(a)
	Residual	83.093	172	.483		
	Total	93.727	175			

a Predictors: (Constant), High School, Expertise, Career
b Dependent Variable: Career helps?

Table 26. ANOVA (CarrP)

Correlation matrix:

Variables	Carrera	Expertise	Prepa	CarrP
Carrera	**1.000**	-0.228	0.271	0.313
Expertise	-0.228	**1.000**	-0.176	-0.064
Prepa	0.271	-0.176	**1.000**	-0.035
CarrP	0.313	-0.064	-0.035	**1.000**

Table 27. Correlation matrix (CarrP)

Summary of the variables selection:

No. of variables	Variables	MSE	R^2	Adjusted R^2	Mallows' Cp	Akaike's AIC
2	Carrera / Prepa	**0.480**	0.113	0.098	2.010	-126.083
3	Carrera / Expertise /	0.483	0.113	0.098	4.000	-124.093

The best model for the selected selection criterion is displayed in blue

Table 28. Variable selection (CarrP)

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	2	10.630	5.315	11.065	< 0.0001
Error	173	83.097	0.480		
Corrected Tota	175	93.727			

Computed against model Y=Mean(Y)

Model parameters:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	1.122	0.134	8.403	< 0.0001	0.858	1.385
Carrera	0.289	0.062	4.679	< 0.0001	0.167	0.411
Expertise	0.000	0.000				
Prepa	-0.188	0.109	-1.734	0.085	-0.403	0.026

Equation of the model:

CarrP = 1.122+0.289*Carrera-0.188*Prepa

Standardized coefficients:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Carrera	0.348	0.074	4.679	< 0.0001	0.201	0.495
Expertise	0.000	0.000				
Prepa	-0.129	0.074	-1.734	0.085	-0.276	0.018

Table 29. Analysis of variance and Equation of the model

(CarrP)

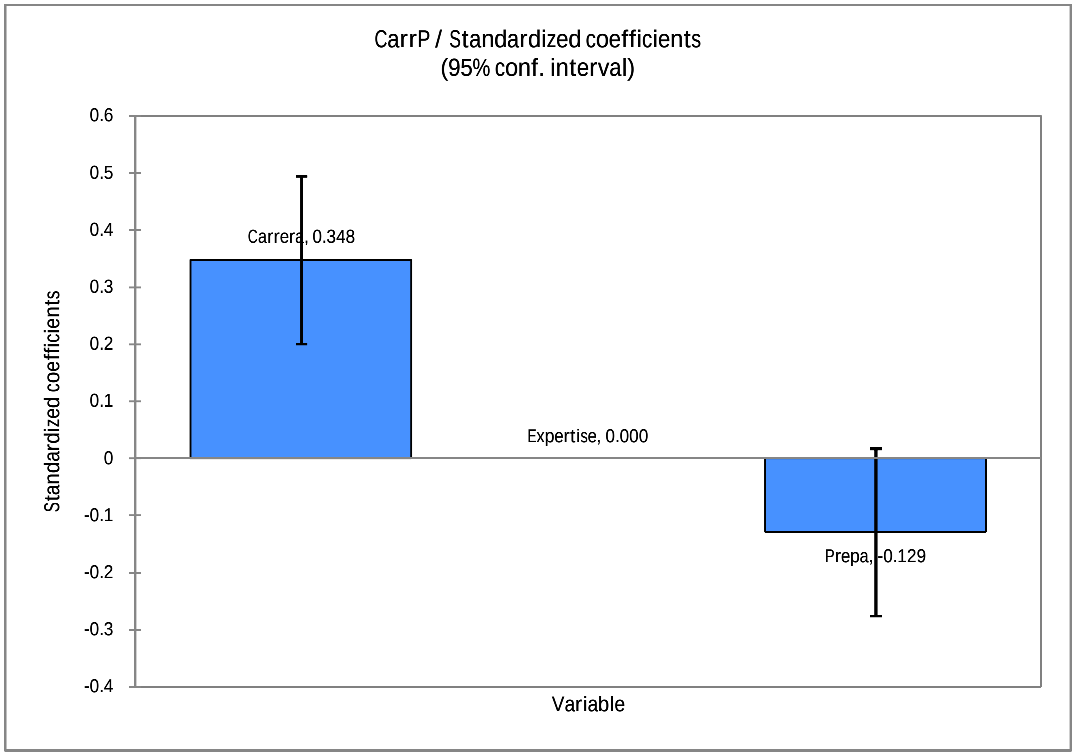

Figure 15. Standardized coefficients (CarrP)

H3: Self-experimentation does not affect rate of CWIS adoption in students (AutoP)

Between-Subjects Factors

		N
Self experimentation time	0	34
	1	29
	2	30
	3	29
	4	17
	5	24
	6	13
Time connection	0	37
	1	43
	2	25
	3	23
	4	14
	5	11
	6	5
	7	8
	8	9
	9	1
Homeworks not delivered	0	46
	1	77
	2	39
	3	14
Expertise	1	45
	2	88
	3	43

Table 30. Between-subjects factors - Self-experimentation helps? (AutoP)

Tests of Between-Subjects Effects

Dependent Variable: Self-experimentation helps?

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	76.341(a)	97	.787	3.833	.000
Intercept	142.076	1	142.076	691.901	.000
Tauto	6.676	6	1.113	5.418	.000
Tuso	.683	9	.076	.370	.946
TarNoEnt	.095	3	.032	.155	.926
Expertise	.410	2	.205	.999	.373
Tauto * Tuso	.828	5	.166	.806	.549
Tauto * TarNoEnt	.985	3	.328	1.598	.197
Tuso * TarNoEnt	1.599	3	.533	2.595	.058
Tauto * Tuso * TarNoEnt	.000	0	.	.	.
Tauto * Expertise	2.048	8	.256	1.246	.284
Tuso * Expertise	1.904	8	.238	1.159	.335
Tauto * Tuso * Expertise	.000	0	.	.	.
TarNoEnt * Expertise	1.381	6	.230	1.121	.358
Tauto * TarNoEnt * Expertise	.177	2	.088	.430	.652
Tuso * TarNoEnt * Expertise	.000	0	.	.	.
Tauto * Tuso * TarNoEnt * Expertise	.000	0	.	.	.
Error	16.017	78	.205		
Total	541.000	176			
Corrected Total	92.358	175			

a R Squared =.827 (Adjusted R Squared =.611)

Table 31. Tests of Between-Subjects Effects - Self-experimentation helps? (AutoP)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.750[a]	.562	.554	.485	.562	73.566	3	172	.000

a. Predictors: (Constant), Homeworks not delivered, Self experimentation time, Time conection

Table 32. Model Summary (AutoP)

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	51.906	3	17.302	73.566	.000(a)
	Residual	40.452	172	.235		
	Total	92.358	175			

a Predictors: (Constant), Homeworks not delivered, Self-experimentation time, Time connection
b Dependent Variable: Self-experimentation helps?

Table 33. ANOVA (AutoP)

Correlation matrix:

Variables	Tauto	Tuso	TarNoEnt	AutoP
Tauto	**1.000**	0.887	-0.335	-0.747
Tuso	0.887	**1.000**	-0.480	-0.644
TarNoEnt	-0.335	-0.480	**1.000**	0.269
AutoP	-0.747	-0.644	0.269	**1.000**

Table 34. Correlation matrix (AutoP)

Summary of the variables selection:

No. of variables	Variables	MSE	R^2	Adjusted R^2	Mallows' Cp	Akaike's AIC
2	Tauto / Tuso	0.235	0.560	0.553	2.681	-252.088
3	Tauto / Tuso / TarNoEnt	**0.235**	0.562	0.554	4.000	-250.783

The best model for the selected selection criterion is displayed in blue

Table 35. Variable selection (AutoP)

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	3	51.906	17.302	73.566	< 0.0001
Error	172	40.452	0.235		
Corrected Total	175	92.358			

Computed against model Y=Mean(Y)

Model parameters:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	2.260	0.092	24.563	< 0.0001	2.078	2.442
Tauto	-0.322	0.043	-7.558	< 0.0001	-0.407	-0.238
Tuso	0.041	0.037	1.099	0.273	-0.032	0.114
TarNoEnt	0.040	0.048	0.825	0.411	-0.055	0.135

Equation of the model:

AutoP = 2.260-0.322*Tauto+0.041*Tuso+0.040*TarNoEnt

Standardized coefficients:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Tauto	-0.849	0.112	-7.558	< 0.0001	-1.070	-0.627
Tuso	0.133	0.121	1.099	0.273	-0.105	0.370
TarNoEnt	0.049	0.059	0.825	0.411	-0.068	0.165

Table 36. Analysis of variance and Equation of the model

(AutoP)

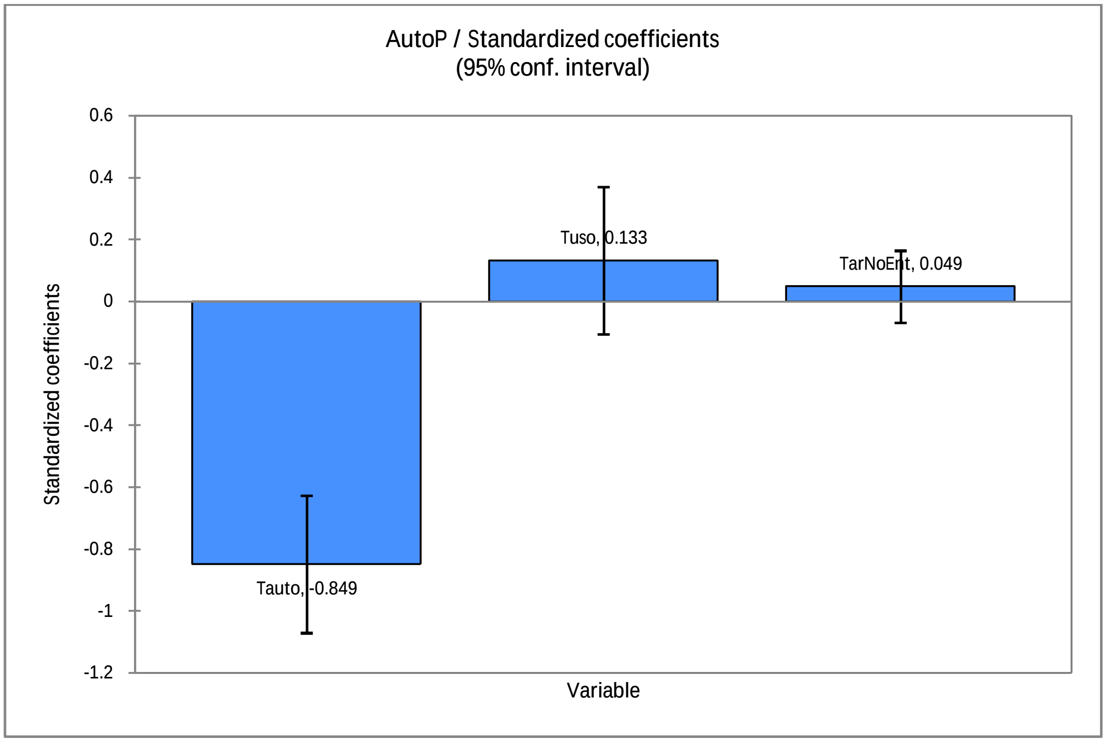

Figure 16. Standardized coefficients (AutoP)

H_4: Students with relationships with skilled CWIS users have similar rate of CWIS adoption than the others (RelP)

Between-Subjects Factors

		N
Times experts consults	0	98
	1	63
	2	13
	3	2
Number of helper friends	0	38
	1	69
	2	44
	3	17
	4	8
Same career helper persons	0	17
	1	41
	2	38
	3	39
	4	14
	5	15
	6	8
	7	4
Other career helper persons	1	12
	2	42
	3	51
	4	50
	5	12
	6	8
	7	1

Table 37. Between-subjects factors - Relationship helps?

(RelP)

Tests of Between-Subjects Effects

Dependent Variable: Relationships helps?

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	63.727(a)	125	.510	.980	.547
Intercept	107.704	1	107.704	207.123	.000
Vexp	2.768	3	.923	1.774	.164
Namigos	.534	4	.134	.257	.904
Npermisma	3.066	7	.438	.842	.558
Nperdife	4.459	6	.743	1.429	.222
Vexp * Namigos	1.917	4	.479	.921	.459
Vexp * Npermisma	3.149	8	.394	.757	.642
Namigos * Npermisma	8.095	16	.506	.973	.499
Vexp * Namigos * Npermisma	2.511	2	1.255	2.414	.100
Vexp * Nperdife	2.121	3	.707	1.360	.266
Namigos * Nperdife	9.610	11	.874	1.680	.106
Vexp * Namigos * Nperdife	.181	1	.181	.348	.558
Npermisma * Nperdife	7.398	19	.389	.749	.751
Vexp * Npermisma * Nperdife	.526	2	.263	.505	.606
Namigos * Npermisma * Nperdife	3.628	8	.454	.872	.546
Vexp * Namigos * Npermisma * Nperdife	.000	0	.	.	.
Error	26.000	50	.520		
Total	548.000	176			
Corrected Total	89.727	175			

a R Squared =.710 (Adjusted R Squared = -.014)

Table 38. Tests of Between-Subjects Effects - Relationships

helps? (RelP)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.115[a]	.013	-.010	.720	.013	.570	4	171	.685

a. Predictors: (Constant), Same career helper persons, Other career helper persons, Times experts consults, Number of help friends

Table 39. Model Summary (RelP)

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.180	4	.295	.570	.685(a)
	Residual	88.548	171	.518		
	Total	89.727	175			

a Predictors: (Constant), Same career helper persons, Other career helper persons, Times experts consults, Number of helper friends
b Dependent Variable: Relationships helps?

Table 40. ANOVA (RelP)

Correlation matrix:

Variables	Vexp	Namigos	Npermisma	Nperdife	RelP
Vexp	**1.000**	0.200	0.077	-0.219	-0.074
Namigos	0.200	**1.000**	0.278	-0.052	0.043
Npermisma	0.077	0.278	**1.000**	0.069	-0.049
Nperdife	-0.219	-0.052	0.069	**1.000**	0.032
RelP	-0.074	0.043	-0.049	0.032	**1.000**

Table 41. Correlation matrix (RelP)

Summary of the variables selection:

No. of variables	Variables	MSE	R^2	Adjusted R^2	Mallows' Cp	Akaike's AIC
2	Vexp / Namigos	0.514	0.009	-0.014	1.743	-114.139
3	Vexp / Namigos / Npermisma	0.515	0.013	-0.010	3.086	-112.813
4	Vexp / Namigos / Npermisma / Nperdife	**0.518**	0.013	-0.010	5.000	-110.902

The best model for the selected selection criterion is displayed in blue

Table 42. Variable selection (RelP)

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	4	1.180	0.295	0.570	0.685
Error	171	88.548	0.518		
Corrected Total	175	89.727			

Computed against model Y=Mean(Y)

Model parameters:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	1.613	0.186	8.656	< 0.0001	1.245	1.981
Vexp	-0.083	0.083	-0.995	0.321	-0.247	0.081
Namigos	0.053	0.054	0.973	0.332	-0.054	0.159
Npermisma	-0.027	0.033	-0.835	0.405	-0.093	0.038
Nperdife	0.013	0.045	0.294	0.769	-0.076	0.103

Equation of the model:

RelP = 1.613-0.083*Vexp+0.053*Namigos-0.0274*Npermisma+0.013*Nperdife

Standardized coefficients:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Vexp	-0.079	0.079	-0.995	0.321	-0.236	0.078
Namigos	0.078	0.081	0.973	0.332	-0.081	0.237
Npermisma	-0.066	0.079	-0.835	0.405	-0.223	0.091
Nperdife	0.023	0.078	0.294	0.769	-0.131	0.177

Table 43. Analysis of variance and Equation of the model

(RelP)

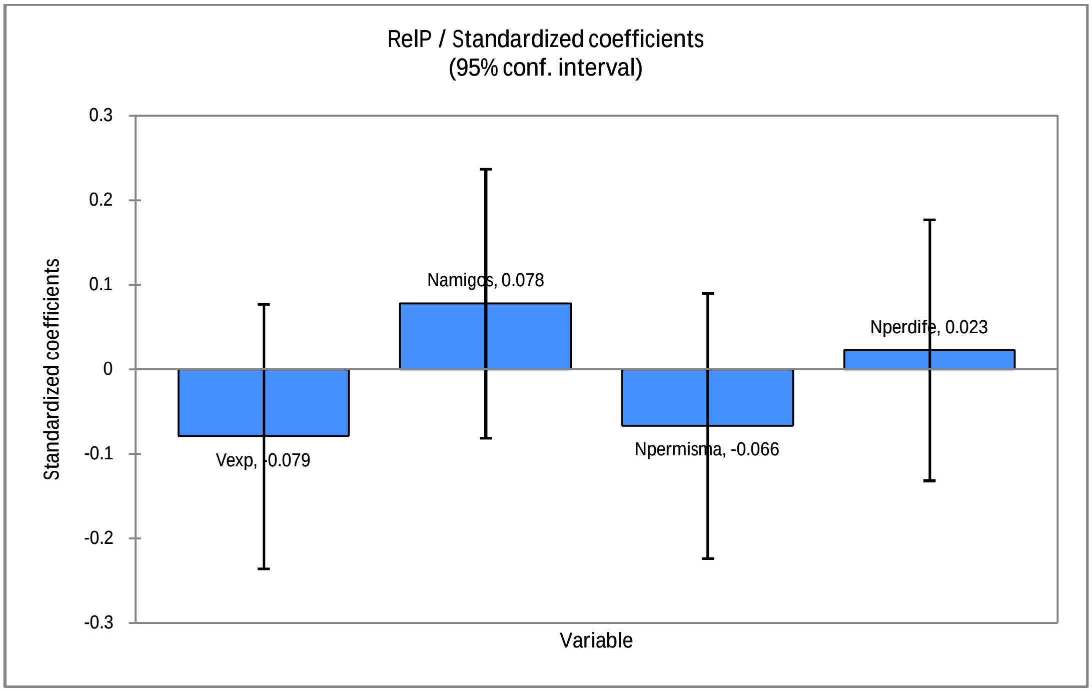

Figure 17. Standardized coefficients (RelP)

H_5:Usage importance does not affect the rate of CWIS adoption in students (ImpP)

Between-Subjects Factors

		N
Homework thru CWIS delivery importance	1	66
	2	49
	3	61
Homeworks not delivered	0	46
	1	77
	2	39
	3	14
CWIS name (0-webtec, 1-BB)	0	65
	1	111

Table 44. Between-subjects factors - Importance given helps? (ImpP)

Tests of Between-Subjects Effects

Dependent Variable: Importance given helps?

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5.444(a)	13	.419	.938	.516
Intercept	101.163	1	101.163	226.513	.000
ImpEntrega	.896	2	.448	1.003	.369
TarNoEnt	.378	3	.126	.282	.838
Plataforma	.620	1	.620	1.388	.240
ImpEntrega * TarNoEnt	4.602	5	.920	2.061	.073
ImpEntrega * Plataforma	.006	1	.006	.013	.909
TarNoEnt * Plataforma	.455	1	.455	1.019	.314
ImpEntrega * TarNoEnt * Plataforma	.000	0	.	.	.
Error	72.351	162	.447		
Total	492.000	176			
Corrected Total	77.795	175			

a R Squared =.070 (Adjusted R Squared = -.005)

Table 45. Tests of Between-Subjects Effects – Importance

given helps? (ImpP)

Model Summary

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.062[a]	.004	-.008	.669	.004	.333	2	173	.717

a. Predictors: (Constant), Homeworks not delivered, Homework thru CWIS delivery importance

Table 46. Model Summary (ImpP)

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.298	2	.149	.333	.717(a)
	Residual	77.497	173	.448		
	Total	77.795	175			

a Predictors: (Constant), Homeworks not delivered, Homework thru CWIS delivery importance
b Dependent Variable: Importance given helps?

Table 47. ANOVA (ImpP)

Correlation matrix:

Variables	ImpEntrega	TarNoEnt	ImpP
ImpEntrega	**1.000**	0.427	0.057
TarNoEnt	0.427	**1.000**	0.046
ImpP	0.057	0.046	**1.000**

Table 48. Correlation matrix (ImpP)

Summary of the variables selection:

No. of variables	Variables	MSE	R^2	Adjusted R^2	Mallows' Cp	Akaike's AIC
2	ImpEntrega / TarNoEnt	**0.448**	0.004	-0.008	3.000	-138.363

The best model for the selected selection criterion is displayed in blue

Table 49. Variable selection (ImpP)

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	2	0.298	0.149	0.333	0.717
Error	173	77.497	0.448		
Corrected Total	175	77.795			

Computed against model Y=Mean(Y)

Model parameters:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	1.441	0.128	11.220	< 0.0001	1.188	1.695
ImpEntrega	0.036	0.066	0.545	0.586	-0.094	0.166
TarNoEnt	0.020	0.063	0.317	0.752	-0.104	0.144

Equation of the model:

ImpP = 1.441+0.036*ImpEntrega+0.020*TarNoEnt

Standardized coefficients:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
ImpEntrega	0.046	0.084	0.545	0.586	-0.120	0.211
TarNoEnt	0.027	0.084	0.317	0.752	-0.139	0.192

Table 50. Analysis of variance and Equation of the model

(ImpP)

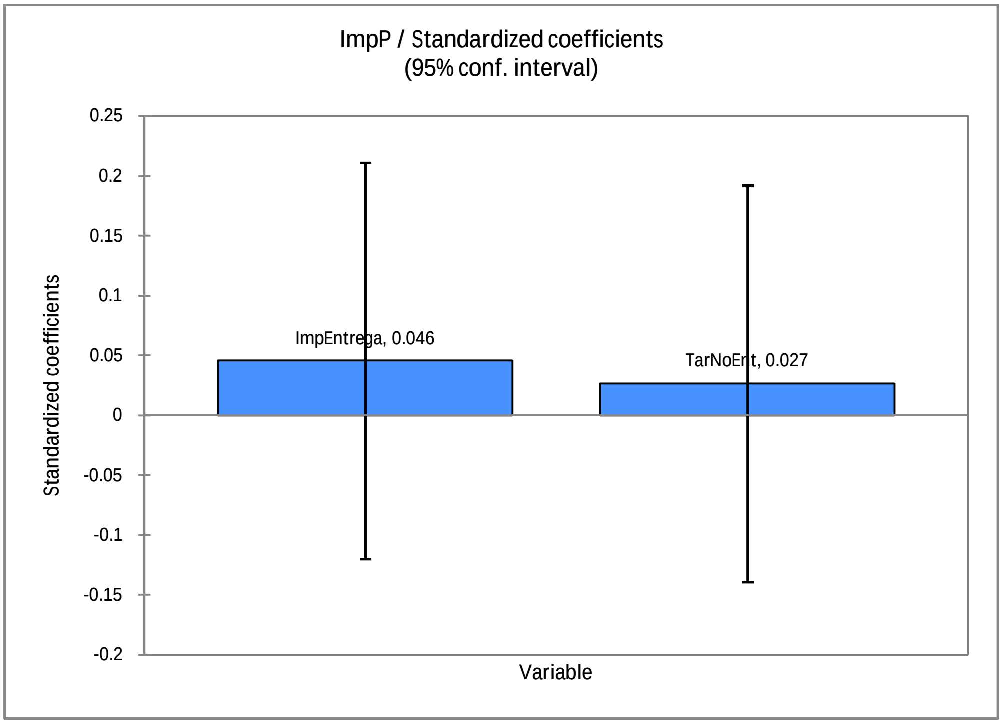

Figure 18. Standardized coefficients (ImpP)

H_6: Students believe that the quality of comments about the use of the CWIS from others does not affect their rate of CWIS adoption (UsoP)

Between-Subjects Factors

		N
Use comments	0	69
	1	64
	2	43
Off line total time	0	64
	1	112
CWIS name (0-webtec, 1-BB)	0	65
	1	111
Failure times	0	43
	1	68
	2	30
	3	16
	4	9
	5	5
	6	3
	7	2

Table 51. Between-subjects factors - Comments on using helps? (UsoP)

Tests of Between-Subjects Effects

Dependent Variable: Comments on using helps?

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	81.957(a)	54	1.518	6.729	.000
Intercept	240.197	1	240.197	1064.900	.000
Comuso	25.920	2	12.960	57.459	.000
Tfueralin	2.113	1	2.113	9.367	.003
Plataforma	.481	1	.481	2.133	.147
Nfallas	2.808	7	.401	1.778	.098
Comuso * Tfueralin	1.752	2	.876	3.883	.023
Comuso * Plataforma	.619	2	.309	1.371	.258
Tfueralin * Plataforma	.001	1	.001	.006	.936
Comuso * Tfueralin * Plataforma	2.267	2	1.133	5.025	.008
Comuso * Nfallas	4.351	10	.435	1.929	.047
Tfueralin * Nfallas	3.378	6	.563	2.496	.026
Comuso * Tfueralin * Nfallas	2.008	5	.402	1.781	.122
Plataforma * Nfallas	1.110	3	.370	1.640	.184
Comuso * Plataforma * Nfallas	3.021	6	.504	2.232	.044
Tfueralin * Plataforma * Nfallas	.862	2	.431	1.911	.152
Comuso * Tfueralin * Plataforma * Nfallas	.612	1	.612	2.713	.102
Error	27.293	121	.226		
Total	728.000	176			
Corrected Total	109.250	175			

a R Squared =.750 (Adjusted R Squared =.639)

Table 52.Tests of Between-Subjects Effects - Comments on using helps? (UsoP)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	F Change	df1	df2	Sig. F Change
1	.786[a]	.617	.608	.495	.617	68.915	4	171	.000

a. Predictors: (Constant), Failure times, Use comments, Off line total time, CWIS name (0-webtec, 1-BB)

Table 53. Model Summary (UsoP)

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	67.425	4	16.856	68.915	.000(a)
	Residual	41.825	171	.245		
	Total	109.250	175			

a Predictors: (Constant), Failure times, Use comments, Off line total time, CWIS name (0-webtec, 1-BB)
b Dependent Variable: Comments on using helps?

Table 54. ANOVA (UsoP)

Correlation matrix:

Variables	Comuso	Tfueralin	Plataforma	Nfallas	UsoP
Comuso	**1.000**	-0.233	-0.129	-0.016	0.780
Tfueralin	-0.233	**1.000**	0.107	-0.064	-0.270
Plataforma	-0.129	0.107	**1.000**	-0.460	-0.106
Nfallas	-0.016	-0.064	-0.460	**1.000**	0.022
UsoP	0.780	-0.270	-0.106	0.022	**1.000**

Table 55. Correlation matrix (UsoP)

Summary of the variables selection:

No. of variables	Variables	MSE	R^2	Adjusted R^2	Mallows' Cp	Akaike's AIC
2	Comuso / Tfueralin	0.242	0.616	0.607	1.476	-246.419
3	Comuso / Tfueralin / Nfallas	0.243	0.617	0.608	3.120	-244.785
4	Comuso / Tfueralin / Plataforma / Nfallas	**0.245**	0.617	0.608	5.000	-242.909

The best model for the selected selection criterion is displayed in blue

Table 56. Variable selection (UsoP)

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	4	67.425	16.856	68.915	< 0.0001
Error	171	41.825	0.245		
Corrected Tota	175	109.250			

Computed against model Y=Mean(Y)

Model parameters:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	1.270	0.121	10.473	< 0.0001	1.031	1.510
Comuso	0.765	0.049	15.488	< 0.0001	0.667	0.862
Tfueralin	-0.151	0.080	-1.888	0.061	-0.309	0.007
Plataforma	0.031	0.088	0.346	0.729	-0.144	0.205
Nfallas	0.019	0.028	0.689	0.491	-0.036	0.075

Equation of the model:

UsoP = 1.270+0.765*Comuso-0.151*Tfueralin+0.031*Plataforma+0.019*Nfallas

Standardized coefficients:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Comuso	0.761	0.049	15.488	< 0.0001	0.664	0.858
Tfueralin	-0.092	0.049	-1.888	0.061	-0.189	0.004
Plataforma	0.019	0.054	0.346	0.729	-0.088	0.125
Nfallas	0.037	0.054	0.689	0.491	-0.069	0.143

Table 57. Analysis of variance and Equation of the model

(UsoP)

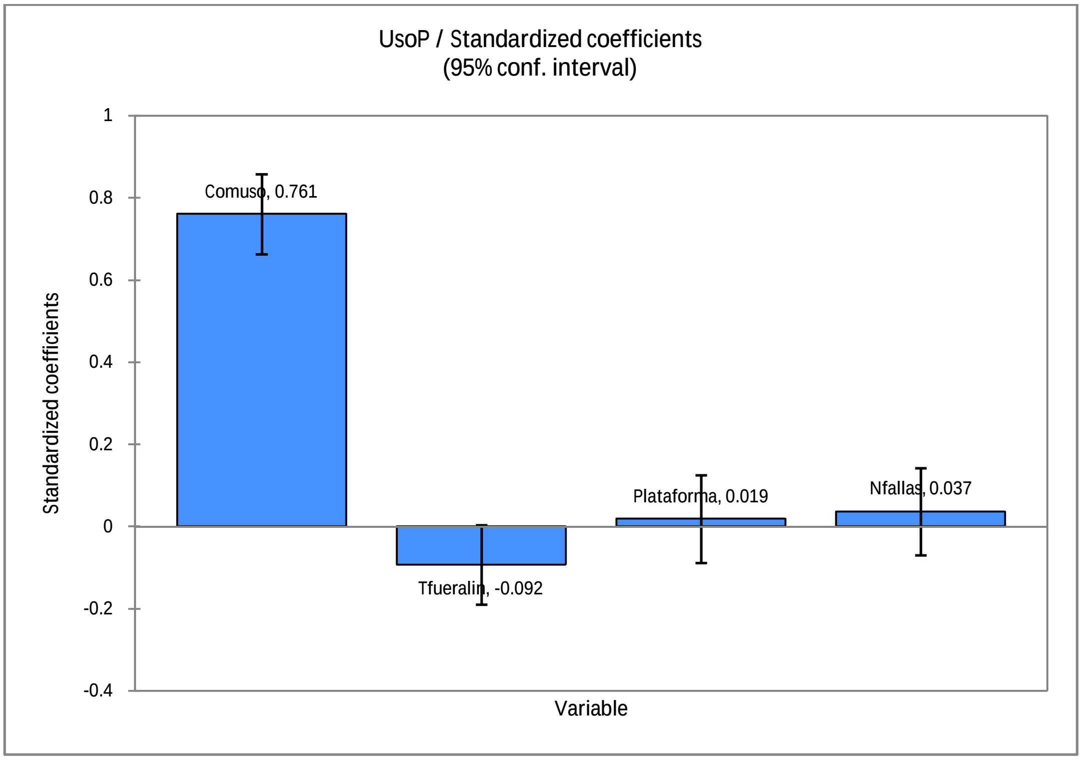

Figure 19. Standardized coefficients (UsoP)

H_7: Students believe that the quality of comments from others about the CWIS technical service does not affect their rate of CWIS adoption (TecP)

Between-Subjects Factors

		N
Tech service comments	0	64
	1	64
	2	48
Complains number	0	65
	1	111
Number of users	0	105
	1	71
CWIS name (0-webtec, 1-BB)	0	65
	1	111

Table 58. Between-subjects factors - Technical service comments helps? (TecP)

Tests of Between-Subjects Effects

Dependent Variable: Comments on tech service helps?

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	94.489(a)	11	8.590	82.154	.000
Intercept	294.841	1	294.841	2819.866	.000
Comtec	31.457	2	15.729	150.430	.000
Nquejas	.000	0	.	.	.
Nusuarios	1.921	1	1.921	18.370	.000
Plataforma	.000	0	.	.	.
Comtec * Nquejas	.000	0	.	.	.
Comtec * Nusuarios	3.301	2	1.651	15.786	.000
Nquejas * Nusuarios	.000	0	.	.	.
Comtec * Nquejas * Nusuarios	.000	0	.	.	.
Comtec * Plataforma	.000	0	.	.	.
Nquejas * Plataforma	.000	0	.	.	.
Comtec * Nquejas * Plataforma	.000	0	.	.	.
Nusuarios * Plataforma	.000	0	.	.	.
Comtec * Nusuarios * Plataforma	.000	0	.	.	.
Nquejas * Nusuarios * Plataforma	.000	0	.	.	.
Comtec * Nquejas * Nusuarios * Plataforma	.000	0	.	.	.
Error	17.148	164	.105		
Total	784.000	176			
Corrected Total	111.636	175			

a R Squared =.846 (Adjusted R Squared =.836)

Table 59. Test of between-subjects effects - Comments on technical service helps? (TecP)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.894[a]	.799	.796	.361	.799	342.974	2	173	.000

a. Predictors: (Constant), Number of users , Tech service comments

Table 60. Model Summary (TecP)

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	89.152	2	44.576	342.974	.000(a)
	Residual	22.485	173	.130		
	Total	111.636	175			

a Predictors: (Constant), Number of users, Tech service comments
b Dependent Variable: Comments os tech service helps?

Table 61. ANOVA (TecP)

Correlation matrix:

Variables	Comtec	Nusuarios	TecP
Comtec	**1.000**	-0.066	0.894
Nusuarios	-0.066	**1.000**	-0.055
TecP	0.894	-0.055	**1.000**

Table 62. Correlation matrix (TecP)

Summary of the variables selection:

No. of variables	Variables	MSE	R^2	Adjusted R^2	Mallows' Cp	Akaike's AIC
2	Comtec / Nusurios	**0.130**	0.799	0.796	3.000	-356.147

Table 63. Variable selection (TecP)

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	2	89.152	44.576	342.974	< 0.0001
Error	173	22.485	0.130		
Corrected Total	175	111.636			

Computed against model Y=Mean(Y)

Model parameters:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	1.135	0.048	23.619	< 0.0001	1.040	1.230
Comtec	0.898	0.034	26.141	< 0.0001	0.831	0.966
Nusurios	0.007	0.056	0.132	0.895	-0.102	0.117

Equation of the model:

TecP = 1.135+0.898*Comtec+0.007*Nusurios

Standardized coefficients:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Comtec	0.894	0.034	26.141	< 0.0001	0.826	0.961
Nusurios	0.005	0.034	0.132	0.895	-0.063	0.072

Table 64. Analysis of variance and Equation of the model

(TecP)

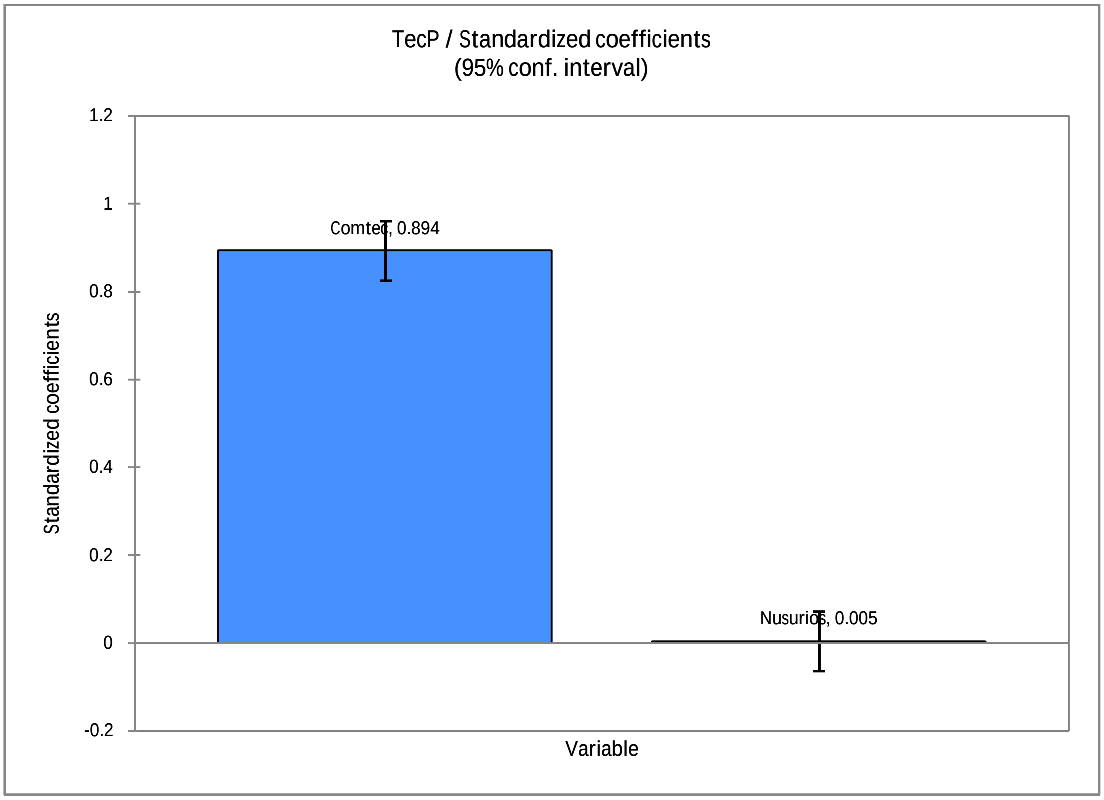

Figure 20. Standardized coefficients (TecP)

H_8: Confidence degree based upon experience does not affect the rate of CWIS adoption in students (ConfP)

Between-Subjects Factors

		N
Expertise	1	45
	2	88
	3	43
Socialship	0	16
	1	99
	2	61
Career	1	65
	2	40
	3	71
Age	1	65
	2	98
	3	13
Gender	1	111
	2	65

Table 65. Between-subjects factors - Self-confidence helps?

(ConfP)

Tests of Between-Subjects Effects

Dependent Variable: Self-confidence helps?

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	24.554(a)	68	.361	.934	.615
Intercept	121.006	1	121.006	313.082	.000
Expertise	.163	2	.081	.210	.811
Social	1.427	2	.713	1.846	.163
Carrera	.496	2	.248	.642	.528
Edad	1.193	2	.596	1.543	.218
Género	2.773	1	2.773	7.176	.009
Expertise * Social	2.411	4	.603	1.560	.190
Expertise * Carrera	.960	4	.240	.621	.648
Social * Carrera	.333	3	.111	.287	.835
Expertise * Social * Carrera	.009	2	.005	.012	.988
Expertise * Edad	3.016	4	.754	1.951	.107

Social * Edad	.787	3	.262	.679	.567
Expertise * Social * Edad	.315	2	.157	.407	.667
Carrera * Edad	.061	3	.020	.052	.984
Expertise * Carrera * Edad	.485	2	.243	.628	.536
Social * Carrera * Edad	.657	1	.657	1.699	.195
Expertise * Social * Carrera * Edad	.000	0	.	.	.
Expertise * Género	1.001	2	.501	1.295	.278
Social * Género	.160	2	.080	.207	.813
Expertise * Social * Género	.092	1	.092	.238	.627
Carrera * Género	.398	2	.199	.515	.599
Expertise * Carrera * Género	.067	1	.067	.173	.678
Social * Carrera * Género	.000	0	.	.	.
Expertise * Social * Carrera * Género	.000	0	.	.	.
Edad * Género	2.891	2	1.445	3.739	.027
Expertise * Edad * Género	1.381	1	1.381	3.572	.061
Social * Edad * Género	.000	0	.	.	.
Expertise * Social * Edad * Género	.000	0	.	.	.
Carrera * Edad * Género	.681	1	.681	1.761	.187
Expertise * Carrera * Edad * Género	.000	0	.	.	.
Social * Carrera * Edad * Género	.000	0	.	.	.
Expertise * Social * Carrera * Edad * Género	.000	0	.	.	.
Error	41.356	107	.387		
Total	450.000	176			
Corrected Total	65.909	175			

a R Squared =.373 (Adjusted R Squared = -.026)

Table 66. Test of between-subjects effects - Self-confidence

helps? (ConfP)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.313[a]	.098	.082	.588	.098	6.222	3	172	.000

a. Predictors: (Constant), Gender, Tech service comments, Age

Table 67. Model Summary (ConfP)

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.453	3	2.151	6.222	.000(a)
	Residual	59.457	172	.346		
	Total	65.909	175			

a Predictors: (Constant), Gender, Tech service comments, Age
b Dependent Variable: Self-confidence helps?

Table 68. ANOVA (ConfP)

Correlation matrix:

Variables	Comtec	Edad	Género	ConfP
Comtec	**1.000**	0.063	-0.061	0.171
Edad	0.063	**1.000**	-0.075	-0.143
Género	-0.061	-0.075	**1.000**	0.211
ConfP	0.171	-0.143	0.211	**1.000**

Table 69. Correlation matrix (ConfP)

Summary of the variables selection:

). of variabl	Variables	MSE	R²	Adjusted R²	Mallows' Cp	Akaike's AIC
2	Comtec / Género	0.351	0.079	0.063	5.662	-181.294
3	Comtec / Edad / Género	**0.346**	0.098	0.082	4.000	-183.002

The best model for the selected selection criterion is displayed in blue

Table 70. Variable selection (ConfP)

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	3	6.453	2.151	6.222	0.000
Error	172	59.457	0.346		
Corrected ˉ	175	65.909			

Computed against model Y=Mean(Y)

Model parameters:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	1.216	0.197	6.162	< 0.0001	0.827	1.606
Comtec	0.149	0.056	2.658	0.009	0.038	0.260
Edad	-0.143	0.075	-1.914	0.057	-0.290	0.004
Género	0.269	0.092	2.921	0.004	0.087	0.451

Equation of the model:

ConfP = 1.216+0.149*Comtec-0.143*Edad+0.269*Género

Standardized coefficients:

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Comtec	0.193	0.073	2.658	0.009	0.050	0.337
Edad	-0.139	0.073	-1.914	0.057	-0.283	0.004
Género	0.212	0.073	2.921	0.004	0.069	0.356

Table 71. Analysis of variance and Equation of the model

(ConfP)

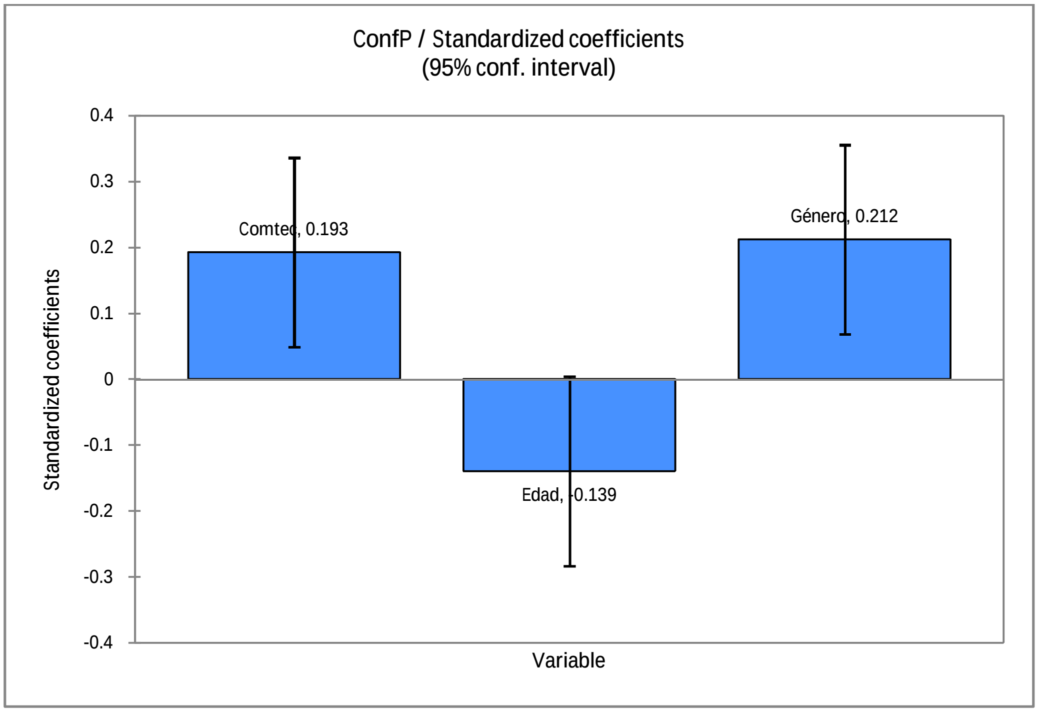

Figure 21. Standardized coefficients (ConfP)

CHAPTER 4. Findings

The purpose of this research was to find factors that affected the rate of adoption of a Campus Wide Information System (CWIS) by novice users. This research will contribute to a better understating of the intersection of Complex Adaptive Systems (CAS) and CWIS by showing us how the novice users' perception affects their introduction to an unfamiliar CWIS. The key dependent variable was "rate of CWIS adoption".

Subjects were novice users of a CWIS; they were first semester students who were using a CWIS for first time. Some of them had previous experience with a CWIS in high school, but the majority had no prior knowledge. Some problems arise when they use the CWIS. Some of these problems are related to relationships among users that emerge when they talk with other novice users or advanced users.

Findings

Novice users and CWIS are linked together in a Complex Adaptive System (CAS). Novice users and CWIS have interactions and interdependences linking them to a high degree. Novice users must to use the CWIS to do their homework, and the CWIS experiment changes done by the users (novice, medium and experts). Novice users and CWIS show co-evolution because students affect CWIS growth and development, and CWIS usage affect novice users' behavior, knowledge and relationships. Every time a new element is added to the CAS (novice users and CWIS new module or function) a new state emerges, but cannot be predicted. New items added to the CWIS or new users inserted in the CAS can produce fluctuations in CWIS actual state with outcomes. Novice users do self-organizing based in different (and difficult to anticipate) ways; CWIS could affect this novice users' self-organization creating a new order of events and interactions.

(Hypothesis H_1): Students with experience with other CWIS have similar rate of CWIS adoption than the others (ExpP)

Hypothesis 1 (Figure 22) is in context stage; novice users with previous experience must have a better rate of CWIS adoption than novice users without this previous expertise, since CWIS design should follow a consistent design in all presentations. Novice users with previous experience cause CWIS developers to make consistent structure menus, consistent processes, and consistent application functions; that is, to reduce learning curve of a CWIS.

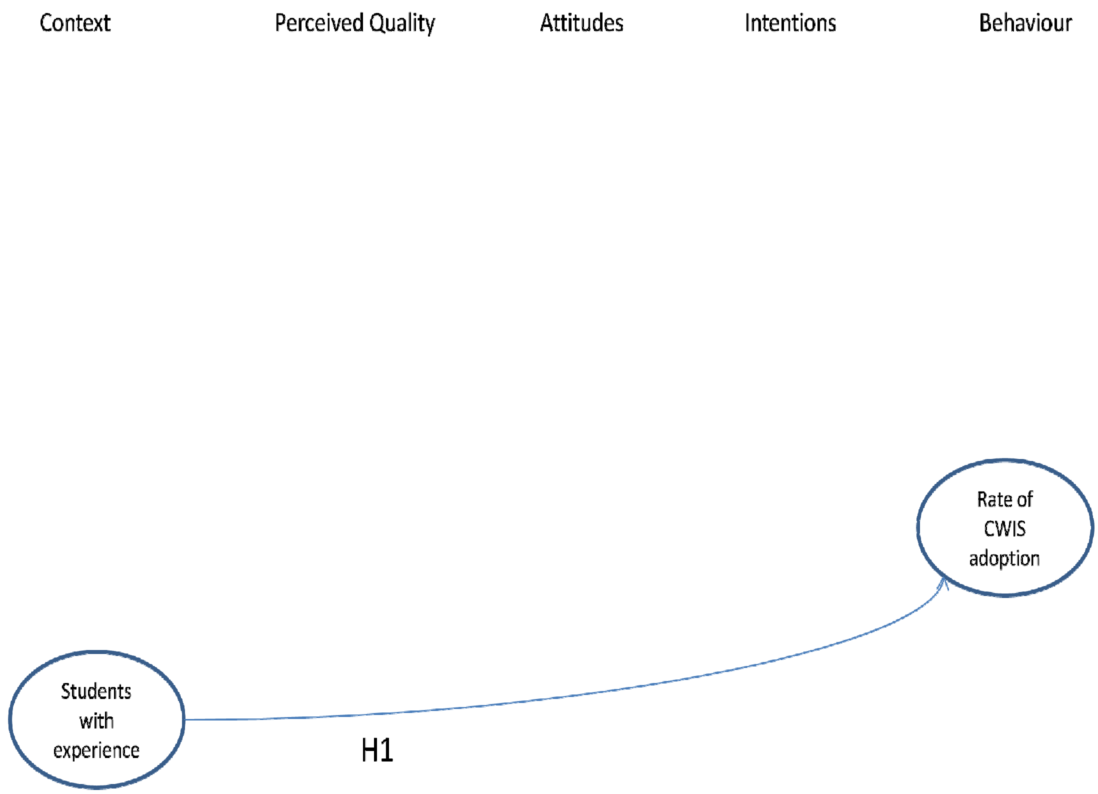

Figure 22. H1: Students with experience with other CWIS have similar rate of CWIS adoption than the others

The kind of Actual Platform Used is significant by itself (0.004). Subjects have access to two different CWIS platforms only, Webtec and Blackboard. Webtec is an in-house CWIS development, mostly used by informatics first-semester students. Blackboard, mostly used by technical and business students, is a product developed by a Washington based software company called Blackboard Inc.

Novice users who have used a similar platform show a greater rate of CWIS adoption than novice users who have not use a CWIS. Most subjects came from high schools associated with the university; therefore most of them had to use similar or same CWIS. Novice users show self-organization in developing relationships among them; grouping by same high school attended, similar career, or any common characteristic, and develop interconnections with CWIS.

Variable Expertise combined with Another CWIS Used Previously and Actual Platform Used has a good significance level (0.027). Another CWIS Used Previously and Actual Platform Used are interrelated, since most of novice users came from associated-to-university high schools. Expertise and Actual Platform Used are linked because novice users with high expertise probably used the same or similar CWIS.

A disclosure is that Expertise is not perceived by novice users as significant (0.149) by it-self, and Another CWIS Used Previously (0.501) is not perceived as significant by itself either. Most probably both are related to previous knowledge of a different CWIS that was actually used. CWIS designers have to use consistent interfaces to reduce the learning curve; this is probably not perceived, which is why novice users with previous experience could develop a good expertise; but when introduced to a new CWIS, they perceive environment change and new skills have to be developed.

Corrected model (Table 72) has good significance (0.009, F-distribution=2.381) then H_{1a} ("Students with other CWIS experience have better rate of CWIS adoption than the others") is accepted and H_1 is rejected, and a pattern in perception is found between Expertise combined with Another CWIS Used Previously and Actual Platform Used.

Subjects perceived in almost 40% of cases (R^2=0.138), that people with Previous Experience with CWIS have better rate of CWIS adoption than the others.

Tests of Between-Subjects Effects

Dependent Variable: (ExpP) Does Previous experience helps?

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	10.416(a)	11	.947	2.381	.009
Intercept	264.711	1	264.711	665.631	.000
Expertise	1.529	2	.765	1.923	.149
Previous use	.181	1	.181	.456	.501
Plataforma	3.376	1	3.376	8.488	.004
Expertise * Previous use	.296	2	.148	.373	.690
Expertise * Plataform	.498	2	.249	.627	.536
UsoPrevio * Plataform	.021	1	.021	.054	.817
Expertise * Previous use * Plataform	2.933	2	1.466	3.687	.027
Error	65.220	164	.398		
Total	448.000	176			
Corrected Total	75.636	175			

a R Squared =.138 (Adjusted R Squared =.080)

Table 72. Tests of Between-Subjects Effects - Students with experience with other CWIS have similar rate of CWIS adoption than the others

(Hypothesis H_2): Students of different careers have similar rate of CWIS adoption (CarrP)

Hypothesis 2 (Figure 23) is in context stage; subjects came from informatics, technical, and business careers. Novice users from informatics and technical careers have a better rate of CWIS adoption than those from business careers. Novice users from informatics and technical careers should have more propensities to use a CWIS, and they must find easily to operate because of their career choice.

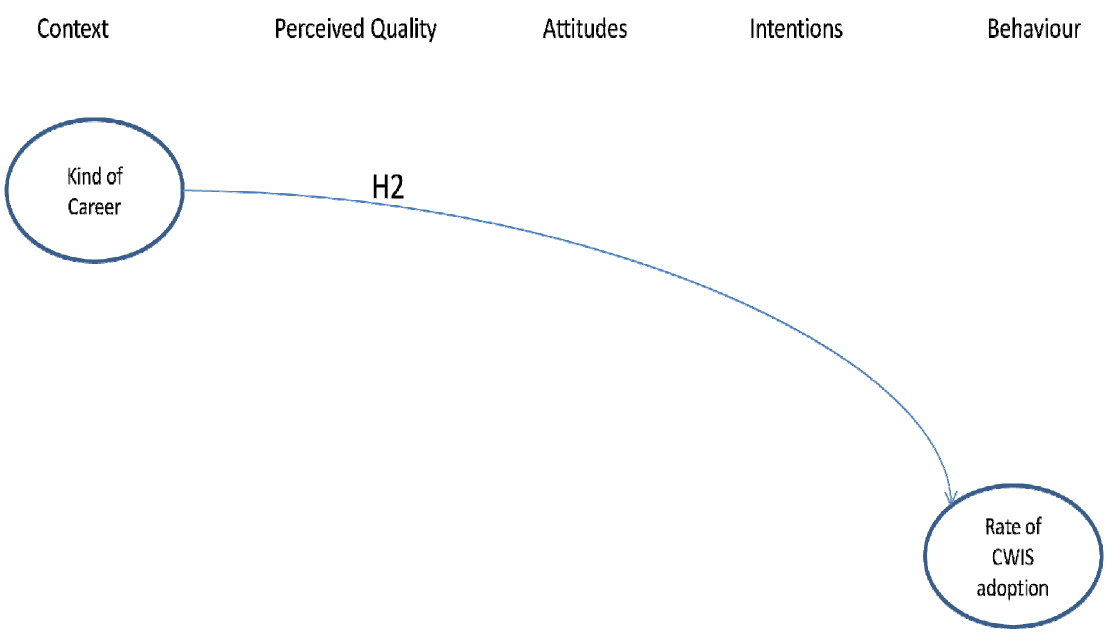

Figure 23. H2: Students of different careers have similar rate of CWIS adoption

The kind of Career is significant by itself (0.000). Subjects are grouped in three career sets: informatics, technical and business students. All of them perceived that the type of career gives novice users advantages in rate of CWIS adoption. Interaction among novice users and CWIS create better CWIS informatics and technical users, by growing and improving the communication among them.

Variable Expertise combined with High School has a good significance level (0.023), probably because most of subjects came from high schools associated to the university, and are (obviously) interconnected Expertise and High School.

Corrected model (Table 73) has good significance (0.001, F-distribution=2.302), therefore, H_{2a} ("Students with informatics or technical related careers have better rate of CWIS adoption than the others") is accepted and H_2 is rejected, and a pattern in perception is found between Expertise and High School.

Subjects perceived that Students with technical and informatics related careers have better rate of CWIS adoption in almost 60% of cases (R^2=0.331).

Tests of Between-Subjects Effects

Dependent Variable: (CarP) Does Career help?

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	31.054(a)	31	1.002	2.302	.001
Intercept	196.945	1	196.945	452.505	.000
Expertise	.298	2	.149	.342	.711
Career	13.904	2	6.952	15.973	.000
Gender	.137	1	.137	.315	.575
High School	.001	1	.001	.003	.953
Expertise * Career	1.370	4	.343	.787	.535
Expertise * Gender	.696	2	.348	.799	.452
Carrera * Gender	1.795	2	.898	2.063	.131
Expertise * Career * Gender	.519	3	.173	.398	.755
Expertise * High School	3.389	2	1.694	3.893	.023
Career * High School	1.187	2	.594	1.364	.259
Expertise * Career * High School	4.625	4	1.156	2.656	.035
Gender* High School	.079	1	.079	.181	.671
Expertise * Gender* Prepa	1.122	2	.561	1.289	.279
Career * Gender * High School	1.889	2	.944	2.170	.118
Expertise * Career * Gender * High School	.240	1	.240	.552	.459
Error	62.674	144	.435		
Total	552.000	176			
Corrected Total	93.727	175			

a R Squared =.331 (Adjusted R Squared =.187)

Table 73. Tests of Between-Subjects Effects - Students of different careers have similar rate of CWIS adoption

(Hypothesis H_3): Self-experimentation does not affect the rate of CWIS adoption in students (AutoP)

Hypothesis 3 (Figure 24) is in the attitudes stage; novice users who dedicate time to explore the CWIS acquire more knowledge than novice users who only do the minimum. Self-experimentation novice users create different kinds of connections between them and the CWIS than non-self-experimentation novice users. Self-experimentation novice users make ripples of disturbance in elements interconnected with them; non-self-experimentation novice users create different kind of ripples.

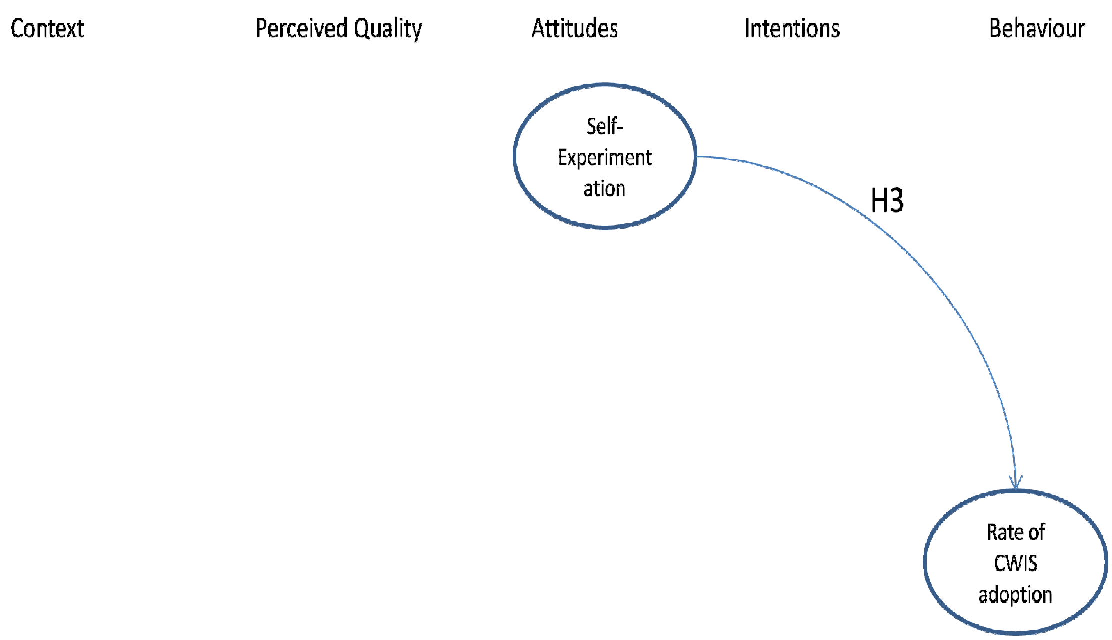

Figure 24. H3: Self-experimentation does not affect the rate of CWIS adoption in students

Self-Experimentation Time is significant by itself (0.000). Self-Experimentation Time is the number of hours dedicated to explore and test features in CWIS, even features not documented; therefore, novice user dedicated to self-experimentation can create multiple and intricate interdependencies with non-deterministic outcomes.

Connection Time combined with Number of Homework not Delivered has a good significance level (0.008); in this study, novice users with high Time Connection have low numbers in Homework not Delivered. In CAS, Homework not Delivered influences Connection Time and vice versa, demonstrating co-evolution between elements, each one affects the other.

A surprise is Connection Time, which does not have a significant level (0.948) by itself; Connection Time is the number of hours connected to the CWIS and is reported by the system. It is negatively correlated to “Does Self-Experimentation Time helps?”, and it could be taken like a contradiction. This means that Connection time (by itself), in subjects, does not contribute to the rate of CWIS adoption.

The Corrected model (Table 74) has a good significance (0.000, F-distribution=3.833), then H_{3a} (“Self-experimentation affects positively the rate of CWIS adoption in students”) is accepted and H_3 is rejected, and a pattern in perception is found between Connection Time combined with Number of Homework not Delivered.

Subjects perceived that Self-Experimentation affects positively the rate of CWIS adoption in students in almost 90% of cases (R^2=0.827).

Tests of Between-Subjects Effects

Dependent Variable: (AutoP) Does Self-experimentation help?

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	76.341(a)	97	.787	3.833	.000
Intercept	142.076	1	142.076	691.901	.000
Tauto	6.676	6	1.113	5.418	.000
Tuso	.683	9	.076	.370	.946
TarNoEnt	.095	3	.032	.155	.926
Expertise	.410	2	.205	.999	.373
Tauto * Tuso	.828	5	.166	.806	.549
Tauto * TarNoEnt	.985	3	.328	1.598	.197
Tuso * TarNoEnt	1.599	3	.533	2.595	.058
Tauto * Tuso * TarNoEnt	.000	0	.	.	.
Tauto * Expertise	2.048	8	.256	1.246	.284
Tuso * Expertise	1.904	8	.238	1.159	.335
Tauto * Tuso * Expertise	.000	0	.	.	.
TarNoEnt * Expertise	1.381	6	.230	1.121	.358
Tauto * TarNoEnt * Expertise	.177	2	.088	.430	.652
Tuso * TarNoEnt * Expertise	.000	0	.	.	.
Tauto * Tuso * TarNoEnt * Expertise	.000	0	.	.	.
Error	16.017	78	.205		
Total	541.000	176			
Corrected Total	92.358	175			

a R Squared =.827 (Adjusted R Squared =.611)

Table 74. Tests of Between-Subjects Effects - Self-experimentation does not affect the rate of CWIS adoption in students

(Hypothesis H_4): Students with relationships with skilled CWIS users have similar rate of CWIS adoption than the others (RelP)

Hypothesis 4 (Figure 25) is in the context stage; novice users develop relationships between them and between other users; they show interdependence when working in teams and also alone; helping them to develop a better CWIS understanding and CWIS usage, and showing co-evolution with novice users by themselves and among other users.

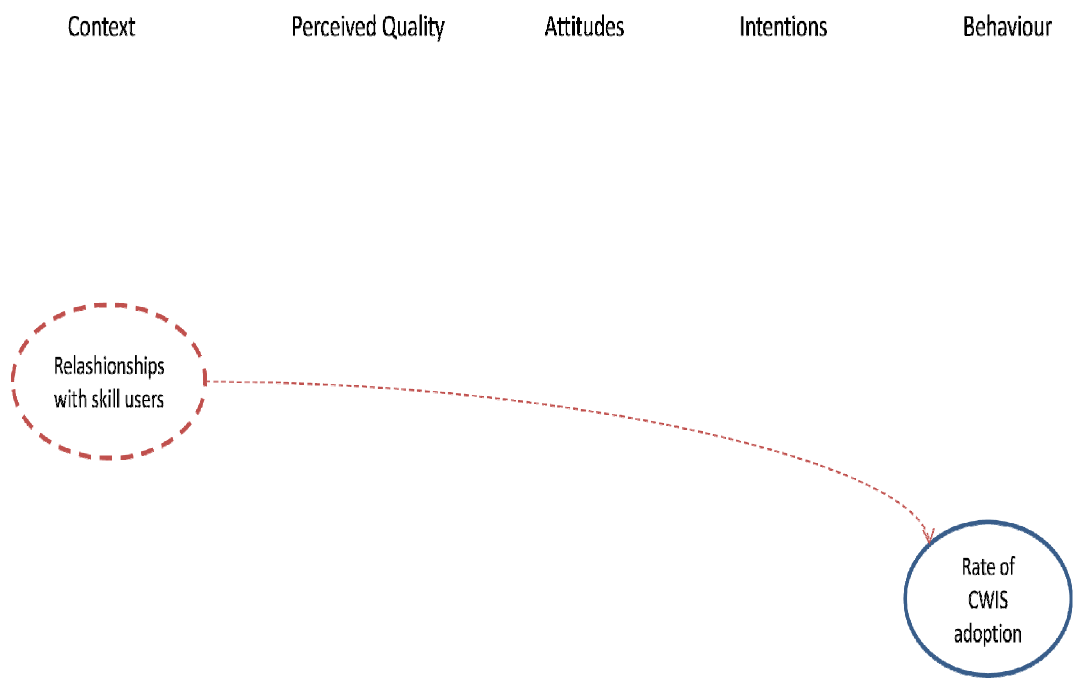

Figure 25. H4: Students with relationships with skilled CWIS users have similar rate of CWIS adoption than the others

None of the variables has significance by itself and no combination of variables has significance by themselves. The corrected model (Table 75) has a significance of 0.547, then H_{4a} is rejected and H_4 ("Students with relationships with skilled CWIS users have similar rate of CWIS adoption than the others") is accepted.

No pattern is presented and almost 85% of students (R^2=0.710) agreed.

This is a revelation because novice users with high socialization skills look for help in CWIS usage, but in a far-from-equilibrium state, they apparently never acquired enough knowledge to manage their tasks in CWIS; perceived relationships with skill users do not have enough value to gain a good rate of CWIS adoption. This hypothesis needs a deeper research or a different kind of research to estimate which of the factors affect relationships' perception.

Tests of Between-Subjects Effects

Dependent Variable: Do Relationships help?

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	63.727(a)	125	.510	.980	.547
Intercept	107.704	1	107.704	207.123	.000
Vexp	2.768	3	.923	1.774	.164
Namigos	.534	4	.134	.257	.904
Npermisma	3.066	7	.438	.842	.558
Nperdife	4.459	6	.743	1.429	.222
Vexp * Namigos	1.917	4	.479	.921	.459
Vexp * Npermisma	3.149	8	.394	.757	.642
Namigos * Npermisma	8.095	16	.506	.973	.499
Vexp * Namigos * Npermisma	2.511	2	1.255	2.414	.100
Vexp * Nperdife	2.121	3	.707	1.360	.266
Namigos * Nperdife	9.610	11	.874	1.680	.106
Vexp * Namigos * Nperdife	.181	1	.181	.348	.558
Npermisma * Nperdife	7.398	19	.389	.749	.751
Vexp * Npermisma * Nperdife	.526	2	.263	.505	.606
Namigos * Npermisma * Nperdife	3.628	8	.454	.872	.546
Vexp * Namigos * Npermisma * Nperdife	.000	0	.	.	.
Error	26.000	50	.520		
Total	548.000	176			
Corrected Total	89.727	175			

a R Squared =.710 (Adjusted R Squared = -.014)

Table 75. Tests of Between-Subjects Effects - Students with relationships with skilled CWIS users have similar rate of CWIS adoption than the others

(Hypothesis H_5): Usage importance does not affect the rate of CWIS adoption in students (ImpP)

Hypothesis 5 (Figure 26) is in the intentions stage; novice users perceive (in different strength) that homework must be delivered using CWIS services. This perception could be modified by the relevance given by professors to use CWIS to deliver tasks and participate in off-line duties. Novice users could perceive different levels of usage importance from the environment, and could move away from norms, rule, and procedures. Even if usage importance is stated, novice users each decide their own behavior.

Figure 26. H5: Usage importance does not affect the rate of CWIS adoption in students

None of the variables has significance by itself and no combination of variables has significance by themselves. The corrected model (Table 76) has a significance of 0.516, then H_{5a} is rejected and H_5 ("Usage importance does not affect the rate of CWIS adoption in students") is accepted.

No pattern is presented and a low R^2 (0.070) is obtained.

A disclosure appears in subjects, they are not affected by the importance of homework and tasks in CWIS. Due to the necessity to do homework using CWIS, it is expected that greater usage importance generates greater rate of CWIS adoption,

Tests of Between-Subjects Effects

Dependent Variable: (ImpP) Importance given helps?

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5.444(a)	13	.419	.938	.516
Intercept	101.163	1	101.163	226.513	.000
ImpEntrega	.896	2	.448	1.003	.369
TarNoEnt	.378	3	.126	.282	.838
Plataforma	.620	1	.620	1.388	.240
ImpEntrega * TarNoEnt	4.602	5	.920	2.061	.073
ImpEntrega * Plataforma	.006	1	.006	.013	.909
TarNoEnt * Plataforma	.455	1	.455	1.019	.314
ImpEntrega * TarNoEnt * Plataforma	.000	0	.	.	.
Error	72.351	162	.447		
Total	492.000	176			
Corrected Total	77.795	175			

a R Squared =.070 (Adjusted R Squared = -.005)

Table 76. Tests of Between-Subjects Effects – Usage importance does not affect the rate of CWIS adoption in students

(Hypothesis H_6): Students believe that the quality of comments about the use of the CWIS from others does not affect their rate of CWIS adoption (UsoP)

Hypothesis 6 (Figure 27) is in the Perceived Quality stage, novice users must be influenced by comments on CWIS usage; this comments predisposed novice users to use the CWIS, bad comments would be prejudicial, and good comments would aid to have a good rate of CWIS adoption.

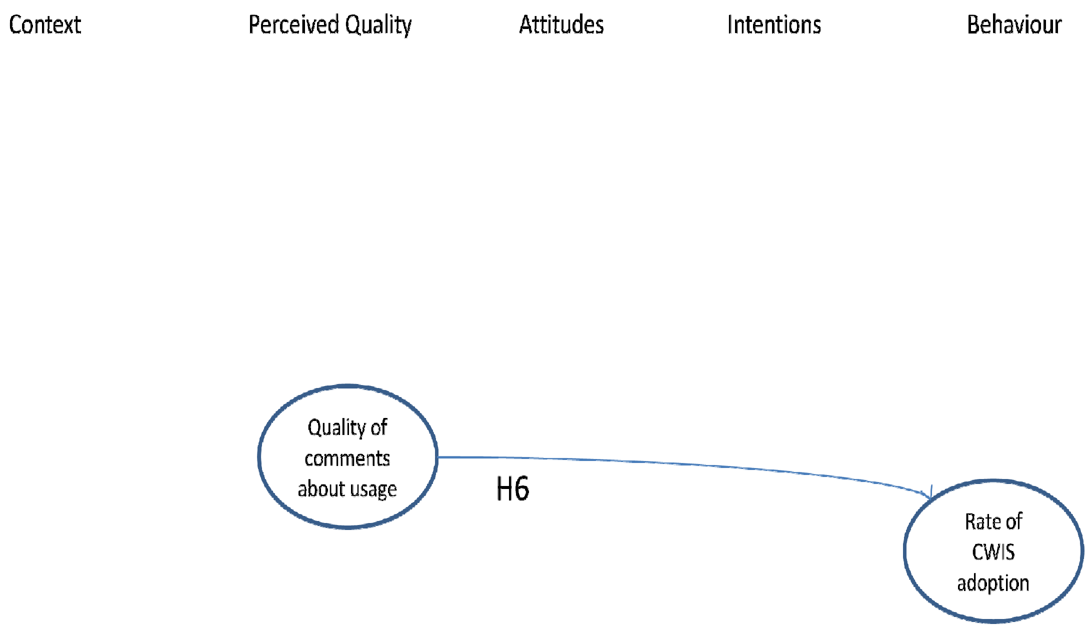

Figure 27. H6: Students believe that the quality of comments about the use of the CWIS from others does not affect their rate of CWIS adoption

Number of Comments of Use is significant by itself (0.000); also Off-Line Total Time is significant by itself (0.003). Number of Comments of Use means the quantity of comments a novice user receives. Off-Line Total Time is the amount (in minutes) CWIS went to a no-service status, secondary to technical problems in data bases or servers, planned maintaining, or interconnectivity problems.

Number of Comments of Use combined with Off-Line Total Time has a good significance level (0.023). Both items are coupled due to the CWIS activity. Both items and Actual CWIS Used has a good significance level (0.008); Actual CWIS Used is related to Off-Line Total Time in a strong way. With respect to Failure Times, the same pattern is observed because Failure Times depend on Actual CWIS Used.

Two key quality parameters in CWIS administration is failure time and off-line total time; novice users (and all other users) perceived a good quality when nothing stops or diminish their CWIS employ. Comments on use are related to the usability of the CWIS, specifically how novice users perceived the easy way of CWIS usage. A novice user could elaborate judgments about CWIS usage and spread them on their colleagues and partners; when a novice user receives comments on usage of CWIS from other novice user (or any user), he takes this comments, and communicates them to other novice users (or any user). Novice users are interconnected and develop interdependence in their conduct, affecting each other in a co-evolution, emerging perceptions' patterns about the good or bad CWIS comments on usage.

Corrected model (Table 77) has good significance (0.000, F-distribution=6.729), then H_{6a} ("Students believe that the quality of comments about the use of the CWIS from others affects their rate of CWIS adoption") is accepted, and a pattern in perception is found between Number of Comments of Use, Off-Line Total Time, Actual CWIS Used, and Failure Times.

Subjects perceived that quality of comments about the use of the CWIS from others affect their rate of CWIS adoption in almost 85% of cases (R^2=0.750).

Tests of Between-Subjects Effects

Dependent Variable: (UsoP) Do comments on usage help?

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	81.957(a)	54	1.518	6.729	.000
Intercept	240.197	1	240.197	1064.900	.000
Comuso	25.920	2	12.960	57.459	.000
Tfueralin	2.113	1	2.113	9.367	.003
Plataforma	.481	1	.481	2.133	.147
Nfallas	2.808	7	.401	1.778	.098
Comuso * Tfueralin	1.752	2	.876	3.883	.023
Comuso * Plataforma	.619	2	.309	1.371	.258
Tfueralin * Plataforma	.001	1	.001	.006	.936
Comuso * Tfueralin * Plataforma	2.267	2	1.133	5.025	.008
Comuso * Nfallas	4.351	10	.435	1.929	.047
Tfueralin * Nfallas	3.378	6	.563	2.496	.026
Comuso * Tfueralin * Nfallas	2.008	5	.402	1.781	.122
Plataforma * Nfallas	1.110	3	.370	1.640	.184
Comuso * Plataforma * Nfallas	3.021	6	.504	2.232	.044
Tfueralin * Plataforma * Nfallas	.862	2	.431	1.911	.152
Comuso * Tfueralin * Plataforma * Nfallas	.612	1	.612	2.713	.102
Error	27.293	121	.226		
Total	728.000	176			
Corrected Total	109.250	175			

a R Squared =.750 (Adjusted R Squared =.639)

Table 77. Tests of Between-Subjects Effects – Students believe that the quality of comments about the use of the CWIS from others does not affect their rate of CWIS adoption

(Hypothesis H_7): Students believe that the quality of comments from others about the CWIS technical service does not affect their rate of CWIS adoption (TecP)

Hypothesis 7 (Figure 29) is in the Perceived Quality stage, novice users must be prejudiced by technical service comments on CWIS usage; this comments influence novice users to utilize the CWIS, bad comments would be damaging, and good comments would provide support to have a good rate of CWIS adoption.

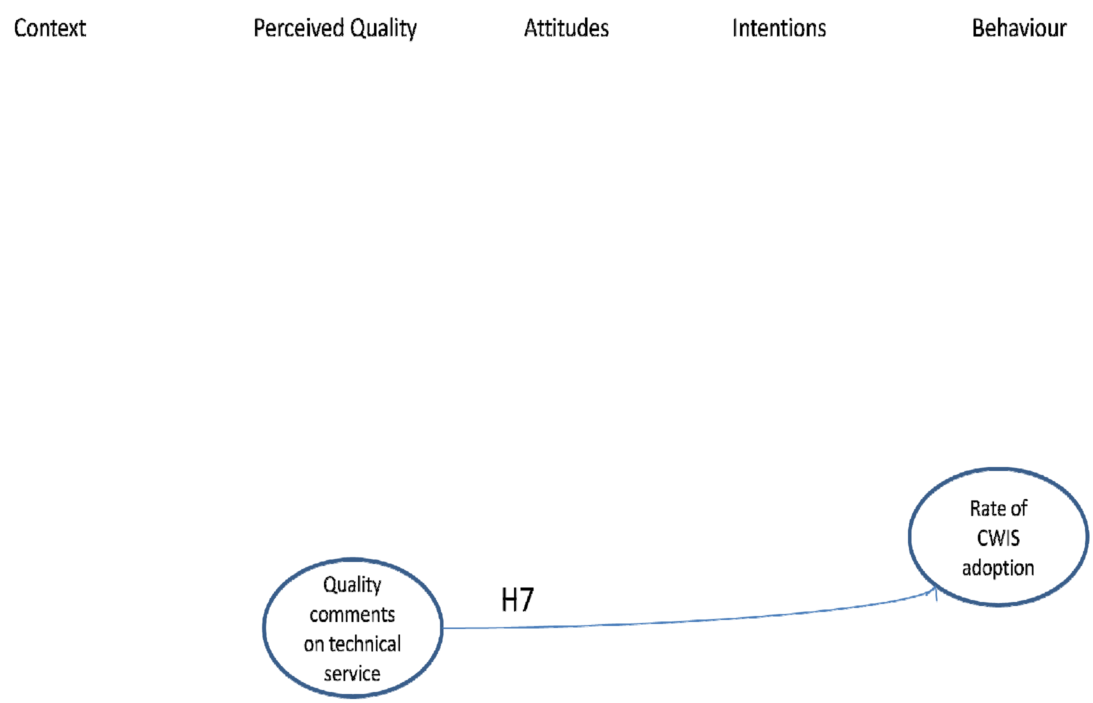

Figure 28. H7: Students believe that the quality of comments from others about the CWIS technical service does not affect their rate of CWIS adoption

Number of Technical Comments of Use is significant by itself (0.000), as well as Number of Users (0.000). Number of Technical Comments of Use refers to the number of technical comments a student receives, Number of Users is the amount of users registered the CWIS has.

Not only are the comments on CWIS usage important (Hypothesis 7), comments on technical problems are important too. Technical problems are related to how novice users perceive technical staff interact with CWIS and them. A novice user could develop opinions about CWIS technical problems and mention them to anyone. When a novice user receives comments on CWIS technical problems from other novice user (or any user), as explained in Hypothesis 7, interlinks help to spread comments and novice users (and any user) are affected, and a pattern emerges about CWIS technical problems in the novice users' mind.

Number of Technical Comments of Use combined with Number of Users has a good significance level (0.000). Both items are tied to the CWIS activity.

The corrected model (Table 78) has good significance (0.000, F-distribution=82.154), then H_{7a} ("Students believe that the quality of comments from others about the CWIS technical service affects their rate of CWIS adoption") is accepted, and a pattern in perception is found between Number of Technical Comments of Use and Number of Users.

Subjects perceived that quality of technical comments about the use of the CWIS from others affects their rate of CWIS adoption in almost 92% of cases (R^2=0.846).

Tests of Between-Subjects Effects

Dependent Variable: (TechP) Do comments on tech service helps?

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	94.489(a)	11	8.590	82.154	.000
Intercept	294.841	1	294.841	2819.866	.000
Comtec	31.457	2	15.729	150.430	.000
Nquejas	.000	0	.	.	.
Nusuarios	1.921	1	1.921	18.370	.000
Plataforma	.000	0	.	.	.
Comtec * Nquejas	.000	0	.	.	.
Comtec * Nusuarios	3.301	2	1.651	15.786	.000
Nquejas * Nusuarios	.000	0	.	.	.
Comtec * Nquejas * Nusuarios	.000	0	.	.	.
Comtec * Plataforma	.000	0	.	.	.
Nquejas * Plataforma	.000	0	.	.	.
Comtec * Nquejas * Plataforma	.000	0	.	.	.
Nusuarios * Plataforma	.000	0	.	.	.
Comtec * Nusuarios * Plataforma	.000	0	.	.	.
Nquejas * Nusuarios * Plataforma	.000	0	.	.	.
Comtec * Nquejas * Nusuarios * Plataforma	.000	0	.	.	.
Error	17.148	164	.105		
Total	784.000	176			
Corrected Total	111.636	175			

a R Squared =.846 (Adjusted R Squared =.836)

Table 78. Tests of Between-Subjects Effects - Students believe that the quality of comments from others about the CWIS technical service does not affect their rate of CWIS adoption

(Hypothesis H_8): Confidence degree based upon experience does not affect the rate of CWIS adoption in students (ConfP)

Hypothesis 8 (Figure 29) is in the context stage; novice users could develop different self-confidence levels by co-evolution with CWIS and other novice users; self-confidence is a concept related with self judgment and abilities. Self-confidence on CWIS could grow by practice or previous experiences in CWIS or similar products. Self-confidence is also a state of mind determined by a comparison between oneself and other novice users interlinked. Skilled novice users know how to demonstrate that they are better in CWIS usage than non-skilled novice users, this in turn, creates an emergence of a different kind of novice user: a self-confidence novice user.

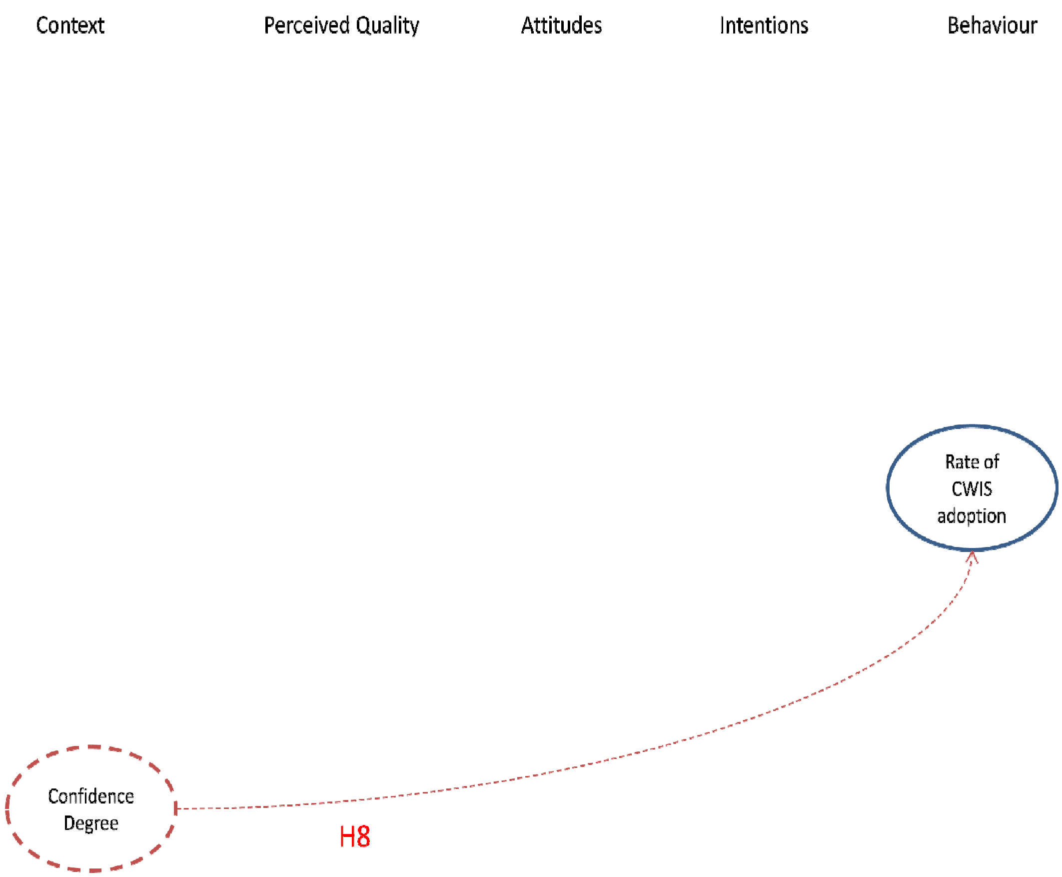

Figure 29. H8: Confidence degree based upon experience does not affect the rate of CWIS adoption in students

Gender is significant by itself (0.009); it refers to the gender of students. Combined with Expertise and Age it is significant too (0.027). The corrected model (Table 79) has a significance level of 0.615 then H_{8a} is rejected and H_8 ("Confidence degree based upon experience does not affect the rate of CWIS adoption in students") is accepted. A low R^2 (0.070) is obtained.

Apparently subjects perceived that self-confidence based upon experience does not affect rate of CWIS adoption. Self-confidence novice users could have a better rate of CWIS adoption, but perceptions in subjects challenge the statements.

Tests of Between-Subjects Effects

Dependent Variable: (ConfP) Does self-confidence helps?

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	24.554(a)	68	.361	.934	.615
Intercept	121.006	1	121.006	313.082	.000
Expertise	.163	2	.081	.210	.811
Social	1.427	2	.713	1.846	.163
Carrera	.496	2	.248	.642	.528
Edad	1.193	2	.596	1.543	.218
Género	2.773	1	2.773	7.176	.009
Expertise * Social	2.411	4	.603	1.560	.190
Expertise * Carrera	.960	4	.240	.621	.648
Social * Carrera	.333	3	.111	.287	.835
Expertise * Social * Carrera	.009	2	.005	.012	.988
Expertise * Edad	3.016	4	.754	1.951	.107
Social * Edad	.787	3	.262	.679	.567
Expertise * Social * Edad	.315	2	.157	.407	.667
Carrera * Edad	.061	3	.020	.052	.984
Expertise * Carrera * Edad	.485	2	.243	.628	.536
Social * Carrera * Edad	.657	1	.657	1.699	.195
Expertise * Social * Carrera * Edad	.000	0	.	.	.
Expertise * Género	1.001	2	.501	1.295	.278
Social * Género	.160	2	.080	.207	.813
Expertise * Social * Género	.092	1	.092	.238	.627
Carrera * Género	.398	2	.199	.515	.599
Expertise * Carrera * Género	.067	1	.067	.173	.678
Social * Carrera * Género	.000	0	.	.	.
Expertise * Social * Carrera * Género	.000	0	.	.	.
Edad * Género	2.891	2	1.445	3.739	.027
Expertise * Edad * Género	1.381	1	1.381	3.572	.061

Social * Edad * Género	.000	0	.	.	.
Expertise * Social * Edad * Género	.000	0	.	.	.
Carrera * Edad * Género	.681	1	.681	1.761	.187
Expertise * Carrera * Edad * Género	.000	0	.	.	.
Social * Carrera * Edad * Género	.000	0	.	.	.
Expertise * Social * Carrera * Edad * Género	.000	0	.	.	.
Error	41.356	107	.387		
Total	450.000	176			
Corrected Total	65.909	175			

a R Squared =.373 (Adjusted R Squared = -.026)

Table 79. Tests of Between-Subjects Effects - Confidence degree based upon experiences does not affect the rate of CWIS adoption in students

Summary

After testing all hypotheses: H_{1a}: Students with other CWIS experience have better rate of CWIS adoption than the others, was accepted. H_{2a}: Students with informatics or technical related careers have better rate of CWIS adoption than the others, was accepted. H_{3a}: Self-experimentation affects positively the rate of CWIS adoption in students, was accepted. H_{4a}: Students with relationships with skilled users of the CWIS have greater rate of CWIS adoption than the others, was rejected. H_{5a}: Usage importance affects the rate of CWIS adoption in students, was rejected. H_{6a}: Students believe that the quality of comments about the use of the CWIS from others affects their rate of CWIS adoption, was accepted. H_{7a}: Students believe that the quality of comments from others about the CWIS technical service affects their rate of CWIS adoption, was accepted. And H_{8a}: Confidence degree based upon experience affects the rate of CWIS adoption in students was rejected.

Patterns found:

Expertise, another CWIS used previously, and actual platform in previous experience help to get better rate of CWIS adoption, but expertise by itself is not important.

Expertise and high school in kind of career help to increase rate of CWIS adoption.

Connection time and number of homework not delivered in self-experimentation are negative related.

Number of comments of use and off-line total time in quality of comments usage help to enhance rate of CWIS adoption.

Number of technical comments and number of users in quality comments on technical service help to improve rate of CWIS adoption.

Final model is shown next (Figure 30).

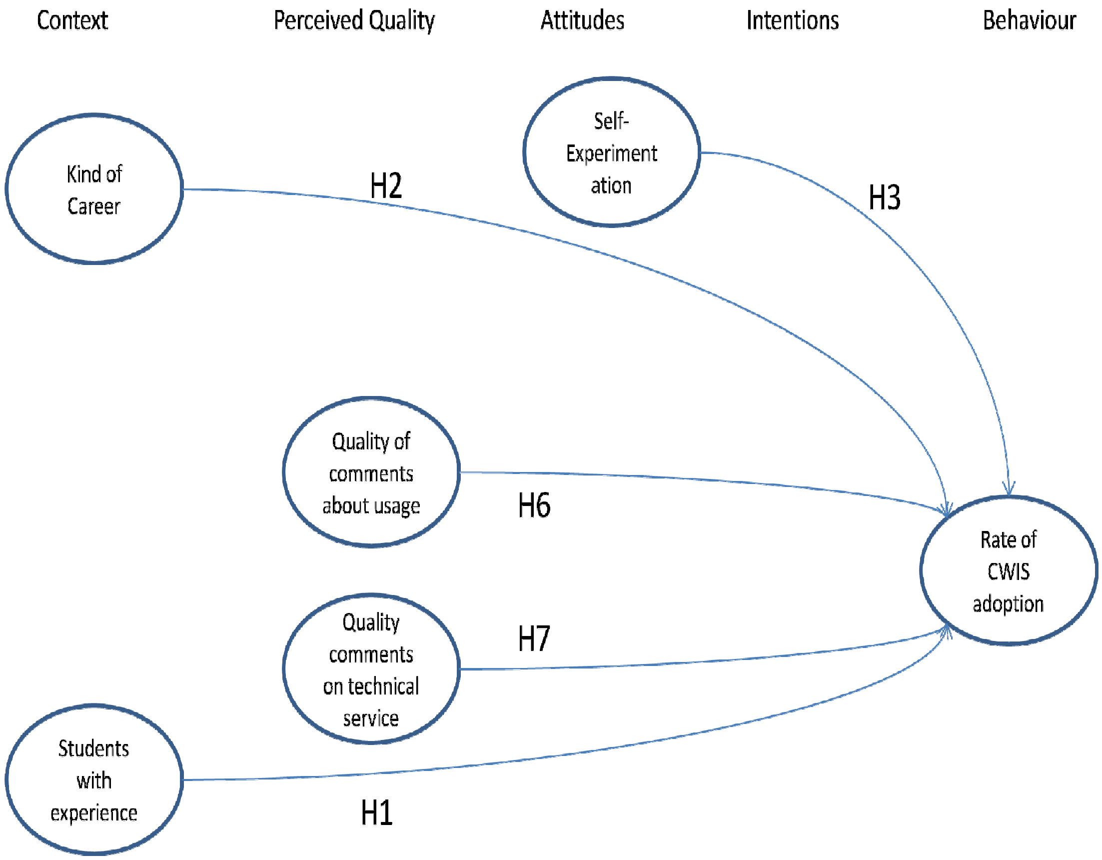

Figure 30. Final Model

Chapter 5. Conclusions

The purpose of this research was to find factors that affected the rate of adoption of a Campus Wide Information System (CWIS) by novice users. This research will contribute to a better understating of the intersection of Complex Adaptive Systems (CAS) and CWIS by showing us how the novice users' perception affects their introduction to an unfamiliar CWIS. The key dependent variable was "rate of CWIS adoption".

Subjects were novice users of a CWIS; they were first semester students who were using a CWIS for first time. Some of them had previous experience with a CWIS in high school, but the majority had no prior knowledge. Some problems arise when they use the CWIS. Some of these problems are related to relationships among users that emerge when they talk with other novice users or advanced users.

After testing the hypotheses, three were rejected: H_{4a}: Students with relationships with skilled users of the CWIS have greater rate of CWIS adoption than the others, H_{5a}: Usage importance affects the rate of CWIS adoption in students, and H_{8a}: Confidence degree based upon experience affects the rate of CWIS adoption in students.

Five hypotheses were accepted: H_{1a}: Students with other CWIS experience have better rate of CWIS adoption than the others, H_{2a}: Students with informatics or technical related careers have better rate of CWIS adoption than the others, H_{3a}: Self-experimentation affects positively the rate of CWIS adoption in students, H_{6a}: Students believe that the quality of comments about the use of the CWIS from others affects their rate of CWIS adoption, and H_{7a}: Students believe that the quality of comments from others about the CWIS technical service affects their rate of CWIS adoption. Final model is showed in Figure 31.

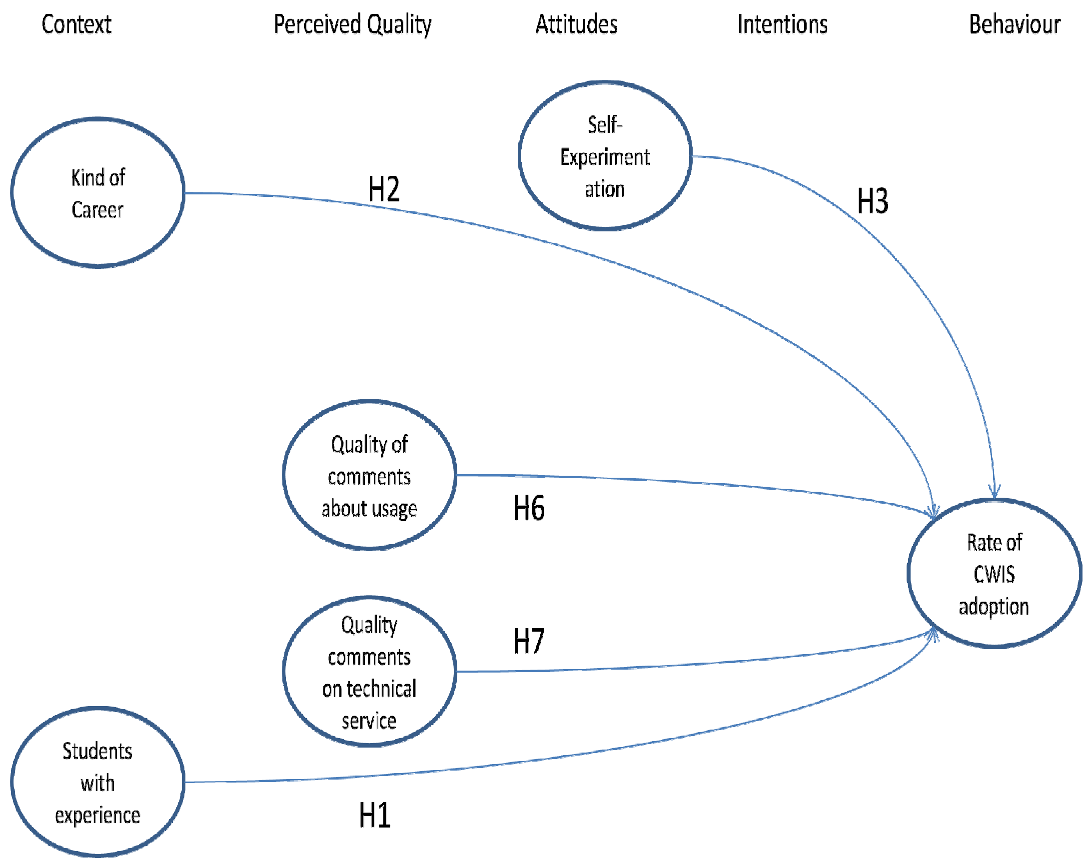

Figure 31. Final Model

Conclusions Related to Individual Hypotheses

(Hypothesis H_{1a}): Students with other CWIS experience have better rate of CWIS adoption than the others

Previous experience helps to raise the rate of CWIS adoption and there is a pattern between Expertise, Another CWIS Used Previously and Actual Platform Used. Expertise is not seen as important by itself. Users develop skills based on past experiences and climb the learning curve at different rates. A novice user could have the feeling of being an expert in CWIS usage, but even so practice with similar or same CWIS is important for rapid CWIS adoption. Only when three factors were present did subjects perceive a good rate of CWIS adoption and this is an expected pattern.

Practitioners could use the fact that novice users perceive Expertise and Another CWIS Used joined to verify the consistency and usability of their CWIS interfaces, tasks, and processes and to make it simpler for novice users to adapt from an old CWIS usage to a new CWIS. Researchers could investigate more reliable and intuitive CWIS interfaces to try to generate a better rate of CWIS adoption by novice users.

(Hypothesis H_{2a}): Students with informatics or technical related careers have a better rate of CWIS adoption than the others

Novice users career choice has an effect on the rate of CWIS adoption and a pattern connecting Expertise and High School is observed. This is not surprising since most of the students came from high schools associated to the university. Most novice users select their career by their attraction to a knowledge area. In informatics and technical novice user selects an informatics or technical career because he or she has developed an accepting capacity for working in a computer environment. Practitioners must be convinced not to select informatics or technical novice users as "model users" of a CWIS, since they constantly do better in efforts to mold their behavior to the CWIS setting. Researchers could try to find other patterns of factors related to the career choices of novice users that help or diminish the rate of CWIS adoption.

(Hypothesis H3a): Self-experimentation affects positively the rate of CWIS adoption in students

Novice users perceived that Self-Experimentation helps to increase the rate of CWIS adoption. One pattern between Connection Time and Number of Homework not Delivered came into view as novice users with high connection time have a low number of homework not delivered and vice versa. It seems that just being connected does not necessarily result in appropriate use of CWIS to deliver homework. Another pattern is the positive relationships between Self-Experimentation Time and rate of CWIS adoption and we would expect this result. The last pattern, an unusual one, is the negative relationship between Connection Time and rate of adoption. Being connected for longer periods of time does not result in faster adoption of CWIS. Nearly all novice users perceived that self-experimentation helps to enhance the rate of CWIS adoption and this is understandable because more practice results in better skills. When combined, if Number of Homework not Delivered is low then Connection Time is high. Although Connection Time by itself introduces a weird effect in the hypothesis, apparently high levels in Connection Time produce low levels in rate of CWIS adoption. Probably a good number of novice users with a large period of connection time have a low throughput in homework delivered, and therefore Connection Time by itself does not guarantee a good rate of CWIS adoption.

Practitioners could help novice users to have better levels of rate of CWIS adoption by developing hands-on tutorials and encourage novice users to do self-experimentation by creating a diversity of tasks to do in different parts of CWIS. Researchers could investigate the effect of connection time on the rate of CWIS adoption.

(Hypothesis H_4): Students with relationships with skilled CWIS users have similar rate of CWIS adoption than the others

No patterns in variables were found and the hypothesis was rejected. However Relationship with Skilled Users, given the centrality of connectivity and interdependence in a CAS, should help novice users in their rate of CWIS adoption. In fact, a large number of the novice users disregarded help from skilled users and perceived using their help would not increase their rate of CWIS adoption. This is a contradiction to expectations given the role of co-evolution in CAS and ideas generally found in theories of information systems learning from secondary users. We would expect that novice users would improve their performance when helped, supported, or affected by interlinked others and that all users (novice and skill) would benefit by taking relevant information from their surroundings.

If novice users dismiss help from skilled users to enhance their rate of CWIS adoption, practitioners should consider supporting novice users by developing on-line tutorials and encouraging increased self-experimentation. Researchers could try to find why skilled users are not taken as a source of knowledge by novice users.

(Hypothesis H_5): Usage importance does not affect the rate of CWIS adoption in students

No patterns in variables were found and the hypothesis was rejected. Usage Importance Given is a crucial element for novice users. They should be aware of the necessity of using CWIS to do their homework as well as other academic tasks. Apparently subjects do not recognize the importance on delivering their homework through the CWIS. This may be because they are enrolled in elementary courses and low importance in delivery of homework using CWIS is perceived.

Practitioners have to encourage novice users to use CWIS, stressing the importance of delivery of tasks using CWIS instead of printed forms or alternate forms like e-mail or instant-messaging systems. Researchers could be interested in investigating why novice users do not value the importance given to delivering homework using CWIS, or how academic staff could communicate the importance of using the CWIS to novice users.

(Hypothesis H_{6a}): Students believe that the quality of comments about the use of the CWIS from others affect their rate of CWIS adoption

Results in testing this hypothesis support that novice user believed that Quality of Comments Usage helps to increase the rate of CWIS adoption. One pattern Number of Comments of Use comes to the fore as novice users receive many comments about use from their colleagues. The other pattern is Off-Line Total Time which is related to CWIS quality of service.

Novice users (and other users) are all interconnected and comments about quality of usage of CWIS are passed from one to another provoking the emergence of a new order. Novice users could be prejudiced toward the CWIS even when they never used it. Therefore, good comments about CWIS usage facilitate novice users having a pleasant session in CWIS, and make its use easy to them leading to a better rate of CWIS adoption.

Practitioners must pay attention to complaints about CWIS and avoid or diminish bad comments on usage. Any novice user is capable of forming a negative attitude and CAS can react in unexpected ways to information. Researchers could explore how different sources of comments can affect the novice users, how comments can be assimilated by novice users, or how fast they can be spread by novice users.

(Hypothesis H_{7a}): Students believe that the quality of comments from others about the CWIS technical service affect their rate of CWIS adoption

Results from testing this hypothesis support the idea that novice users perceive that Quality Comments on Technical Service helps them to have a better rate of CWIS adoption. One pattern, Number of Technical Comments, comes to the fore as novice users interchange comments on technical service with their colleagues. The other pattern is Number of Users, which is related to the size of CWIS.

Users in a CWIS are interconnected. Comments about quality of technical service flow from one to another developing the emergence of a new order. Novice users can be biased toward a CWIS even they have never used it. Therefore, good comments on technical service of CWIS smoothes the progress of novice users in learning CWIS tasks and helps to have an improved rate of CWIS adoption.

Practitioners should be prepared to attend to complaints on technical service in CWIS to try to avoid bad comments. Researchers could explore how technical comments can affect novice users depending on the source, or how a technical problem can be misinterpreted by novice users.

(Hypothesis H_8): Confidence degree based upon experience does not affect the rate of CWIS adoption in students

Patterns relating rate of adoption to Gender and Self-Confidence were found. Female novice users are more self-confident than male, but the overall hypothesis was rejected. Self-confidence drives novice users to use a CWIS; nevertheless subjects do not value this attitude. A self-confident novice user is not a prominent user. It seems as though being perceived by their colleagues as having high self-confidence does not increase the rate of CWIS adoption.

Practitioners could use self-confident novice users as testers of new designs of CWIS, or encourage finding weakness or bugs. Researchers could try to find out why female novice users are more self-confident than their male colleagues, or try to investigate which factors in CWIS design could diminish the self-confidence of novice users after using it.

General Conclusions from the Study

The adoption of a CWIS is, perhaps, more complicated than is generally recognized. Often, information technology implementation is seen as a purely technical problem; however, this study clearly demonstrates that many other factors play a critical role. Some of these factors, such as willingness to experiment with the system, may be expected but some, such as connection time, are not as immediately obvious. More deterministic theories of organizations can often mask important variables when examining issues such as CWIS adoption.

The use of a Complex Adaptive Systems framework helps us in being alert for less technical factors and in interpreting survey results. It became clear that the interactions among users are very important but some factors, such as the willingness of novice CWIS users to ignore advice from more experienced users were surprising.

Individual demographic factors do not play a very significant role in CWIS adoption and this suggests that these factors may be less important than one might suspect.

There is considerable room for more research into student acceptance and use of information technology. Despite the need for more study, the results reported here can be of considerable value to practitioners as they attempt to implement information technology in their environments.

Campus Wide Information Systems are here to stay. Both the economics of higher education and the complexity of the current educational system make these systems a necessary part of campus life. This research has indicated that attention to a broad set of factors and the use of dynamic frameworks for analysis are both required if students, faculty and administrators are to gain expected benefits.

Future Research

This study is simply the beginning of research that should be undertaken in order to gain a better understanding of Campus Wide Information Systems (CWIS). The findings of this study indicated that many assumptions about the relationship of CWIS and students may be mistaken and that CWIS adoption and utilization is a not as straight forward as one might suspect. This suggests that CWIS is a fertile field for research in a great variety of discipline areas including ethics, education, information systems, computer sciences, administration, and organization theory. We suggest a small number of research questions suggested by our present study.

In this research subjects were first-semester students, but there are several other important stakeholders to consider when evaluating CWIS. Included among these are sophomore students, senior students, virtual students, faculty members, teacher assistants, educational administrators, financial administrators, library staff, system developers, system operators, system administrators, scholarship administrators, parents and student candidates. All of these CWIS stakeholders interact with one another and with the CWIS and these interactions will likely result in non-linear links leading to both expected and unexpected behaviors. This suggests research questions such as, “Do virtual students have the same rate of CWIS adoption as in-classroom students?”, “Is the rate of CWIS adoption in real-time systems’ students different than the rate of adoption for asynchronous systems’ students?”, “What kind of material should the library have available to support various stakeholders?”, “What kinds of evidence about academic work should a student collect in his/her electronic portfolio?”, and “How can faculty improve their courses using CWIS team tools?”. Research addressing these kinds of questions could lead to a better understanding of the overall role of a CWIS in academic life.

The present research focused on quantitative analysis of readily measured and observed variables. The theoretical approaches as well as the results obtained lead us to suggest that there are important qualitative variables that could be analyzed in order to gain a deeper understanding of the relationship of CWIS to important stakeholders. Research questions such as the following might be particularly good candidates for qualitative research approaches, “How does organizational culture affect the rate of CWIS adoption?”, “How does students culture influence the rate of CWIS adoption?”, “Which ethical issues are present in CWIS usage?”, “Is it possible to observe respect and tolerance in the messages between students using CWIS discussion boards?”, “How can democracy in decision-making be observed in CWIS communications?”, “How much trust do faculty and students have in CWIS?”, “How can a CWIS improve the quality of life for students and faculty?”, “How does a CWIS affect the co-evaluation in virtual and in-classroom teams?”, “Which competences does a student need in order to use a CWIS effectively?”, “Which kind of competences does as student develop when using a CWIS?”, and “Which one of competences developed for CWIS use will be useful in a student’s future work life?”.

The study conducted here showed that CWIS adoption and utilization is a not as straight forward as one might suspect. This suggests that CWIS is a fertile field for research in a great variety of discipline areas including ethics, education, information systems, computer sciences, administration, and organization theory. The research questions noted above are a small sample of the potential areas of future study.

APPENDIX

Descriptive Statistics - Previous experience helps?(ExpP)

Descriptive Statistics

Dependent Variable: Previous experience helps?

Expertise	Another CWIS used	CWIS name (0-webtec, 1-BB)	Mean	Std. Deviation	N
1	0	0	1.33	.516	6
		1	2.00	.775	11
		Total	1.76	.752	17
	1	0	1.29	.488	7
		1	1.62	.740	21
		Total	1.54	.693	28
	Total	0	1.31	.480	13
		1	1.75	.762	32
		Total	1.62	.716	45
2	0	0	1.13	.342	16
		1	1.68	.832	31
		Total	1.49	.748	47
	1	0	1.38	.506	13
		1	1.36	.559	28
		Total	1.37	.536	41
	Total	0	1.24	.435	29
		1	1.53	.728	59
		Total	1.43	.657	88
3	0	0	1.36	.497	14
		1	1.17	.408	6
		Total	1.30	.470	20
	1	0	1.00	.000	9
		1	1.57	.756	14
		Total	1.35	.647	23
	Total	0	1.22	.422	23
		1	1.45	.686	20
		Total	1.33	.566	43
Total	0	0	1.25	.439	36
		1	1.69	.803	48
		Total	1.50	.703	84
	1	0	1.24	.435	29
		1	1.49	.669	63

			Mean	Std. Deviation	N
		Total	1.41	.614	92
	Total	0	1.25	.434	65
		1	1.58	.733	111
		Total	1.45	.657	176

Table 80. Descriptive Statistics - Previous experience helps?

(ExpP)

Descriptive Statistics - Career helps?(CarrP)

Descriptive Statistics

Dependent Variable: Career helps?

Expertise	Career	Gender	High School	Mean	Std. Deviation	N
1	1	1	0	1.20	.447	5
			1	1.25	.500	4
			Total	1.22	.441	9
		2	0	1.00	.	1
			1	1.00	.000	3
			Total	1.00	.000	4
		Total	0	1.17	.408	6
			1	1.14	.378	7
			Total	1.15	.376	13
	2	1	0	1.33	.577	3
			1	3.00	.000	2
			Total	2.00	1.000	5
		Total	0	1.33	.577	3
			1	3.00	.000	2
			Total	2.00	1.000	5
	3	1	0	1.80	.837	5
			1	1.63	.916	8
			Total	1.69	.855	13
		2	0	2.50	.707	2
			1	1.92	.669	12
			Total	2.00	.679	14
		Total	0	2.00	.816	7
			1	1.80	.768	20
			Total	1.85	.770	27
	Total	1	0	1.46	.660	13
			1	1.71	.914	14
			Total	1.59	.797	27
		2	0	2.00	1.000	3

			Mean	Std. Deviation	N
		Total	1.41	.614	92
	Total	0	1.25	.434	65
		1	1.58	.733	111
		Total	1.45	.657	176

Table 80. Descriptive Statistics - Previous experience helps?

(ExpP)

Descriptive Statistics - Career helps?(CarrP)

Descriptive Statistics

Dependent Variable: Career helps?

Expertise	Career	Gender	High School	Mean	Std. Deviation	N
1	1	1	0	1.20	.447	5
			1	1.25	.500	4
			Total	1.22	.441	9
		2	0	1.00	.	1
			1	1.00	.000	3
			Total	1.00	.000	4
		Total	0	1.17	.408	6
			1	1.14	.378	7
			Total	1.15	.376	13
	2	1	0	1.33	.577	3
			1	3.00	.000	2
			Total	2.00	1.000	5
		Total	0	1.33	.577	3
			1	3.00	.000	2
			Total	2.00	1.000	5
	3	1	0	1.80	.837	5
			1	1.63	.916	8
			Total	1.69	.855	13
		2	0	2.50	.707	2
			1	1.92	.669	12
			Total	2.00	.679	14
		Total	0	2.00	.816	7
			1	1.80	.768	20
			Total	1.85	.770	27
	Total	1	0	1.46	.660	13
			1	1.71	.914	14
			Total	1.59	.797	27
		2	0	2.00	1.000	3

			1	1.73	.704	15
			Total	1.78	.732	18
		Total	0	1.56	.727	16
			1	1.72	.797	29
			Total	1.67	.769	45
2	1	1	0	1.31	.479	16
			1	1.33	.516	6
			Total	1.32	.477	22
		2	0	1.00	.	1
			1	1.00	.000	6
			Total	1.00	.000	7
		Total	0	1.29	.470	17
			1	1.17	.389	12
			Total	1.24	.435	29
	2	1	0	2.30	.675	10
			1	1.60	.843	10
			Total	1.95	.826	20
		2	0	1.50	.548	6
			1	3.00	.	1
			Total	1.71	.756	7
		Total	0	2.00	.730	16
			1	1.73	.905	11
			Total	1.89	.801	27
	3	1	0	2.00	.632	6
			1	1.56	.882	9
			Total	1.73	.799	15
		2	0	1.60	.894	5
			1	1.83	.835	12
			Total	1.76	.831	17
		Total	0	1.82	.751	11
			1	1.71	.845	21
			Total	1.75	.803	32
	Total	1	0	1.75	.718	32
			1	1.52	.770	25
			Total	1.65	.744	57
		2	0	1.50	.674	12
			1	1.63	.831	19
			Total	1.58	.765	31
		Total	0	1.68	.708	44
			1	1.57	.789	44
			Total	1.63	.748	88
3	1	1	0	1.38	.506	13
			1	1.50	.837	6

			Total	1.42	.607	19
		2	0	1.00	.000	4
			Total	1.00	.000	4
		Total	0	1.29	.470	17
			1	1.50	.837	6
			Total	1.35	.573	23
	2	1	0	2.33	.577	3
			1	1.33	.577	3
			Total	1.83	.753	6
		2	0	1.50	.707	2
			Total	1.50	.707	2
		Total	0	2.00	.707	5
			1	1.33	.577	3
			Total	1.75	.707	8
	3	1	0	2.00	.	1
			1	2.00	.	1
			Total	2.00	.000	2
		2	0	2.67	.577	3
			1	1.29	.488	7
			Total	1.70	.823	10
		Total	0	2.50	.577	4
			1	1.38	.518	8
			Total	1.75	.754	12
	Total	1	0	1.59	.618	17
			1	1.50	.707	10
			Total	1.56	.641	27
		2	0	1.67	.866	9
			1	1.29	.488	7
			Total	1.50	.730	16
		Total	0	1.62	.697	26
			1	1.41	.618	17
			Total	1.53	.667	43
Total	1	1	0	1.32	.475	34
			1	1.38	.619	16
			Total	1.34	.519	50
		2	0	1.00	.000	6
			1	1.00	.000	9
			Total	1.00	.000	15
		Total	0	1.28	.452	40
			1	1.24	.523	25
			Total	1.26	.477	65
	2	1	0	2.13	.719	16
			1	1.73	.884	15
			Total	1.94	.814	31

	2	0	1.50	.535	8
		1	3.00	.	1
		Total	1.67	.707	9
	Total	0	1.92	.717	24
		1	1.81	.911	16
		Total	1.88	.791	40
3	1	0	1.92	.669	12
		1	1.61	.850	18
		Total	1.73	.785	30
	2	0	2.10	.876	10
		1	1.74	.729	31
		Total	1.83	.771	41
	Total	0	2.00	.756	22
		1	1.69	.769	49
		Total	1.79	.773	71
Total	1	0	1.65	.680	62
		1	1.57	.791	49
		Total	1.61	.728	111
	2	0	1.63	.770	24
		1	1.61	.737	41
		Total	1.62	.744	65
	Total	0	1.64	.701	86
		1	1.59	.763	90
		Total	1.61	.732	176

Table 81. Descriptive Statistics - Career helps? (CarrP)

Descriptive Statistics – Self-experimentation helps?(AutoP)

Descriptive Statistics

Dependent Variable: Self-experimentation helps?

Self-experimentation time	Time connection	Homeworks not delivered	Expertise	Mean	Std. Deviation	N
0	0	0	1	2.50	.707	2
			2	3.00	.000	2
			3	3.00	.	1
			Total	2.80	.447	5
		1	1	2.40	.548	5
			2	3.00	.	1
			3	3.00	.000	2
			Total	2.63	.518	8

		2	0	1.50	.535	8
			1	3.00	.	1
			Total	1.67	.707	9
		Total	0	1.92	.717	24
			1	1.81	.911	16
			Total	1.88	.791	40
	3	1	0	1.92	.669	12
			1	1.61	.850	18
			Total	1.73	.785	30
		2	0	2.10	.876	10
			1	1.74	.729	31
			Total	1.83	.771	41
		Total	0	2.00	.756	22
			1	1.69	.769	49
			Total	1.79	.773	71
	Total	1	0	1.65	.680	62
			1	1.57	.791	49
			Total	1.61	.728	111
		2	0	1.63	.770	24
			1	1.61	.737	41
			Total	1.62	.744	65
		Total	0	1.64	.701	86
			1	1.59	.763	90
			Total	1.61	.732	176

Table 81. Descriptive Statistics - Career helps? (CarrP)

Descriptive Statistics – Self-experimentation helps?(AutoP)

Descriptive Statistics

Dependent Variable: Self-experimentation helps?

Self-experimentation time	Time connection	Homeworks not delivered	Expertise	Mean	Std. Deviation	N
0	0	0	1	2.50	.707	2
			2	3.00	.000	2
			3	3.00	.	1
			Total	2.80	.447	5
		1	1	2.40	.548	5
			2	3.00	.	1
			3	3.00	.000	2
			Total	2.63	.518	8

		2	1	2.80	.447	5
			2	2.67	.516	6
			3	3.00	.000	2
			Total	2.77	.439	13
		3	1	2.50	.577	4
			2	3.00	.000	2
			3	3.00	.	1
			Total	2.71	.488	7
		Total	1	2.56	.512	16
			2	2.82	.405	11
			3	3.00	.000	6
			Total	2.73	.452	33
	1	1	2	3.00	.	1
			Total	3.00	.	1
		Total	2	3.00	.	1
			Total	3.00	.	1
	Total	0	1	2.50	.707	2
			2	3.00	.000	2
			3	3.00	.	1
			Total	2.80	.447	5
		1	1	2.40	.548	5
			2	3.00	.000	2
			3	3.00	.000	2
			Total	2.67	.500	9
		2	1	2.80	.447	5
			2	2.67	.516	6
			3	3.00	.000	2
			Total	2.77	.439	13
		3	1	2.50	.577	4
			2	3.00	.000	2
			3	3.00	.	1
			Total	2.71	.488	7
		Total	1	2.56	.512	16
			2	2.83	.389	12
			3	3.00	.000	6
			Total	2.74	.448	34
1	0	2	2	2.00	.000	2
			3	1.00	.	1
			Total	1.67	.577	3
		3	2	1.00	.	1
			Total	1.00	.	1
		Total	2	1.67	.577	3
			3	1.00	.	1
			Total	1.50	.577	4
	1	0	1	2.00	.	1
			2	1.80	.447	5
			Total	1.83	.408	6
		1	1	1.67	.577	3
			2	1.80	.447	5
			3	1.33	.577	3
			Total	1.64	.505	11
		2	1	2.00	.	1

			2	1.33	.577	3
			3	2.00	.	1
			Total	1.60	.548	5
		3	2	2.00	.	1
			3	1.00	.	1
			Total	1.50	.707	2
		Total	1	1.80	.447	5
			2	1.71	.469	14
			3	1.40	.548	5
			Total	1.67	.482	24
	2	0	3	2.00	.	1
			Total	2.00	.	1
		Total	3	2.00	.	1
			Total	2.00	.	1
	Total	0	1	2.00	.	1
			2	1.80	.447	5
			3	2.00	.	1
			Total	1.86	.378	7
		1	1	1.67	.577	3
			2	1.80	.447	5
			3	1.33	.577	3
			Total	1.64	.505	11
		2	1	2.00	.	1
			2	1.60	.548	5
			3	1.50	.707	2
			Total	1.63	.518	8
		3	2	1.50	.707	2
			3	1.00	.	1
			Total	1.33	.577	3
		Total	1	1.80	.447	5
			2	1.71	.470	17
			3	1.43	.535	7
			Total	1.66	.484	29
2	1	1	1	1.50	.577	4
			2	2.00	.000	3
			3	2.00	.000	2
			Total	1.78	.441	9
		2	1	1.50	.707	2
			2	1.67	.577	3
			3	2.00	.	1
			Total	1.67	.516	6
		3	1	2.00	.	1
			Total	2.00	.	1
		Total	1	1.57	.535	7
			2	1.83	.408	6
			3	2.00	.000	3
			Total	1.75	.447	16
	2	0	2	1.33	.577	3
			Total	1.33	.577	3
		1	1	2.00	.000	2
			2	1.50	.707	2
			Total	1.75	.500	4
		2	2	2.00	.	1
			Total	2.00	.	1
		Total	1	2.00	.000	2
			2	1.50	.548	6
			Total	1.63	.518	8

	3	0	1	1.00	.	1
			2	1.50	.707	2
			3	1.00	.	1
			Total	1.25	.500	4
		1	1	1.00	.	1
			Total	1.00	.	1
		Total	1	1.00	.000	2
			2	1.50	.707	2
			3	1.00	.	1
			Total	1.20	.447	5
	4	0	2	1.00	.	1
			Total	1.00	.	1
		Total	2	1.00	.	1
			Total	1.00	.	1
	Total	0	1	1.00	.	1
			2	1.33	.516	6
			3	1.00	.	1
			Total	1.25	.463	8
		1	1	1.57	.535	7
			2	1.80	.447	5
			3	2.00	.000	2
			Total	1.71	.469	14
		2	1	1.50	.707	2
			2	1.75	.500	4
			3	2.00	.	1
			Total	1.71	.488	7
		3	1	2.00	.	1
			Total	2.00	.	1
		Total	1	1.55	.522	11
			2	1.60	.507	15
			3	1.75	.500	4
			Total	1.60	.498	30
3	1	2	2	2.00	.	1
			Total	2.00	.	1
		Total	2	2.00	.	1
			Total	2.00	.	1
	2	0	1	2.00	.	1
			Total	2.00	.	1
		1	1	1.00	.	1
			2	1.33	.516	6
			Total	1.29	.488	7
		2	1	1.00	.	1
			3	1.25	.500	4
			Total	1.20	.447	5
		Total	1	1.33	.577	3
			2	1.33	.516	6
			3	1.25	.500	4
			Total	1.31	.480	13
	3	0	2	1.33	.577	3
			Total	1.33	.577	3
		1	1	1.00	.	1
			2	1.00	.000	2
			3	1.00	.	1
			Total	1.00	.000	4
		Total	1	1.00	.	1
			2	1.20	.447	5
			3	1.00	.	1

			Total	1.14	.378	7
	4	0	2	1.50	.707	2
			Total	1.50	.707	2
		1	1	1.00	.	1
			2	2.00	.	1
			3	1.50	.707	2
			Total	1.50	.577	4
		Total	1	1.00	.	1
			2	1.67	.577	3
			3	1.50	.707	2
			Total	1.50	.548	6
	5	0	3	1.00	.	1
			Total	1.00	.	1
		1	2	1.00	.	1
			Total	1.00	.	1
		Total	2	1.00	.	1
			3	1.00	.	1
			Total	1.00	.000	2
	Total	0	1	2.00	.	1
			2	1.40	.548	5
			3	1.00	.	1
			Total	1.43	.535	7
		1	1	1.00	.000	3
			2	1.30	.483	10
			3	1.33	.577	3
			Total	1.25	.447	16
		2	1	1.00	.	1
			2	2.00	.	1
			3	1.25	.500	4
			Total	1.33	.516	6
		Total	1	1.20	.447	5
			2	1.38	.500	16
			3	1.25	.463	8
			Total	1.31	.471	29
4	1	3	2	1.00	.	1
			Total	1.00	.	1
		Total	2	1.00	.	1
			Total	1.00	.	1
	2	2	2	1.00	.	1
			Total	1.00	.	1
		3	2	1.00	.	1
			Total	1.00	.	1
		Total	2	1.00	.000	2
			Total	1.00	.000	2
	3	1	2	1.00	.	1
			3	1.00	.	1
			Total	1.00	.000	2
		2	2	1.00	.000	2
			Total	1.00	.000	2
		Total	2	1.00	.000	3
			3	1.00	.	1

			Total	1.00	.000	4
	4	0	1	1.00	.	1
			Total	1.00	.	1
		1	1	1.00	.	1
			2	1.00	.	1
			Total	1.00	.000	2
		Total	1	1.00	.000	2
			2	1.00	.	1
			Total	1.00	.000	3
	5	1	1	1.00	.000	3
			2	1.00	.	1
			Total	1.00	.000	4
		Total	1	1.00	.000	3
			2	1.00	.	1
			Total	1.00	.000	4
	6	0	2	1.00	.	1
			3	1.00	.	1
			Total	1.00	.000	2
		1	3	1.00	.	1
			Total	1.00	.	1
		Total	2	1.00	.	1
			3	1.00	.000	2
			Total	1.00	.000	3
	Total	0	1	1.00	.	1
			2	1.00	.	1
			3	1.00	.	1
			Total	1.00	.000	3
		1	1	1.00	.000	4
			2	1.00	.000	3
			3	1.00	.000	2
			Total	1.00	.000	9
		2	2	1.00	.000	3
			Total	1.00	.000	3
		3	2	1.00	.000	2
			Total	1.00	.000	2
		Total	1	1.00	.000	5
			2	1.00	.000	9
			3	1.00	.000	3
			Total	1.00	.000	17
5	2	3	2	1.00	.	1
			Total	1.00	.	1
		Total	2	1.00	.	1
			Total	1.00	.	1
	3	0	3	1.00	.	1
			Total	1.00	.	1
		1	1	1.00	.	1
			2	1.00	.000	3
			Total	1.00	.000	4

		2	2	1.00	.	1
			3	1.00	.	1
			Total	1.00	.000	2
		Total	1	1.00	.	1
			2	1.00	.000	4
			3	1.00	.000	2
			Total	1.00	.000	7
	4	0	2	1.00	.	1
			Total	1.00	.	1
		1	3	1.00	.000	3
			Total	1.00	.000	3
		Total	2	1.00	.	1
			3	1.00	.000	3
			Total	1.00	.000	4
	5	0	3	1.00	.	1
			Total	1.00	.	1
		1	2	1.00	.000	2
			3	1.00	.	1
			Total	1.00	.000	3
		Total	2	1.00	.000	2
			3	1.00	.000	2
			Total	1.00	.000	4
	6	1	2	1.00	.000	2
			Total	1.00	.000	2
		Total	2	1.00	.000	2
			Total	1.00	.000	2
	7	0	1	1.00	.	1
			2	1.00	.	1
			3	1.00	.000	2
			Total	1.00	.000	4
		1	1	1.00	.	1
			2	1.00	.	1
			Total	1.00	.000	2
		Total	1	1.00	.000	2
			2	1.00	.000	2
			3	1.00	.000	2
			Total	1.00	.000	6
	Total	0	1	1.00	.	1
			2	1.00	.000	2
			3	1.00	.000	4
			Total	1.00	.000	7
		1	1	1.00	.000	2
			2	1.00	.000	8
			3	1.00	.000	4
			Total	1.00	.000	14
		2	2	1.00	.	1
			3	1.00	.	1
			Total	1.00	.000	2
		3	2	1.00	.	1
			Total	1.00	.	1
		Total	1	1.00	.000	3
			2	1.00	.000	12
			3	1.00	.000	9
			Total	1.00	.000	24
6	5	0	2	1.00	.	1
			Total	1.00	.	1

		Total	2	1.00	.	1
			Total	1.00	.	1
	7	0	2	1.00	.	1
			3	1.00	.	1
			Total	1.00	.000	2
		Total	2	1.00	.	1
			3	1.00	.	1
			Total	1.00	.000	2
	8	0	2	1.00	.000	2
			3	1.00	.000	3
			Total	1.00	.000	5
		1	2	1.00	.000	3
			3	1.00	.	1
			Total	1.00	.000	4
		Total	2	1.00	.000	5
			3	1.00	.000	4
			Total	1.00	.000	9
	9	0	3	1.00	.	1
			Total	1.00	.	1
		Total	3	1.00	.	1
			Total	1.00	.	1
	Total	0	2	1.00	.000	4
			3	1.00	.000	5
			Total	1.00	.000	9
		1	2	1.00	.000	3
			3	1.00	.	1
			Total	1.00	.000	4
		Total	2	1.00	.000	7
			3	1.00	.000	6
			Total	1.00	.000	13
Total	0	0	1	2.50	.707	2
			2	3.00	.000	2
			3	3.00	.	1
			Total	2.80	.447	5
		1	1	2.40	.548	5
			2	3.00	.	1
			3	3.00	.000	2
			Total	2.63	.518	8
		2	1	2.80	.447	5
			2	2.50	.535	8
			3	2.33	1.155	3
			Total	2.56	.629	16
		3	1	2.50	.577	4
			2	2.33	1.155	3
			3	3.00	.	1
			Total	2.50	.756	8
		Total	1	2.56	.512	16
			2	2.57	.646	14
			3	2.71	.756	7
			Total	2.59	.599	37
	1	0	1	2.00	.	1
			2	1.80	.447	5
			Total	1.83	.408	6
		1	1	1.57	.535	7
			2	2.00	.500	9
			3	1.60	.548	5
			Total	1.76	.539	21

	2	1	1.67	.577	3
		2	1.57	.535	7
		3	2.00	.000	2
		Total	1.67	.492	12
	3	1	2.00	.	1
		2	1.50	.707	2
		3	1.00	.	1
		Total	1.50	.577	4
	Total	1	1.67	.492	12
		2	1.78	.518	23
		3	1.63	.518	8
		Total	1.72	.504	43
2	0	1	2.00	.	1
		2	1.33	.577	3
		3	2.00	.	1
		Total	1.60	.548	5
	1	1	1.67	.577	3
		2	1.38	.518	8
		Total	1.45	.522	11
	2	1	1.00	.	1
		2	1.50	.707	2
		3	1.25	.500	4
		Total	1.29	.488	7
	3	2	1.00	.000	2
		Total	1.00	.000	2
	Total	1	1.60	.548	5
		2	1.33	.488	15
		3	1.40	.548	5
		Total	1.40	.500	25
3	0	1	1.00	.	1
		2	1.40	.548	5
		3	1.00	.000	2
		Total	1.25	.463	8
	1	1	1.00	.000	3
		2	1.00	.000	6
		3	1.00	.000	2
		Total	1.00	.000	11
	2	2	1.00	.000	3
		3	1.00	.	1
		Total	1.00	.000	4
	Total	1	1.00	.000	4
		2	1.14	.363	14
		3	1.00	.000	5
		Total	1.09	.288	23
4	0	1	1.00	.	1
		2	1.25	.500	4
		Total	1.20	.447	5
	1	1	1.00	.000	2
		2	1.50	.707	2
		3	1.20	.447	5
		Total	1.22	.441	9

	Total	1	1.00	.000	3
		2	1.33	.516	6
		3	1.20	.447	5
		Total	1.21	.426	14
5	0	2	1.00	.	1
		3	1.00	.000	2
		Total	1.00	.000	3
	1	1	1.00	.000	3
		2	1.00	.000	4
		3	1.00	.	1
		Total	1.00	.000	8
	Total	1	1.00	.000	3
		2	1.00	.000	5
		3	1.00	.000	3
		Total	1.00	.000	11
6	0	2	1.00	.	1
		3	1.00	.	1
		Total	1.00	.000	2
	1	2	1.00	.000	2
		3	1.00	.	1
		Total	1.00	.000	3
	Total	2	1.00	.000	3
		3	1.00	.000	2
		Total	1.00	.000	5
7	0	1	1.00	.	1
		2	1.00	.000	2
		3	1.00	.000	3
		Total	1.00	.000	6
	1	1	1.00	.	1
		2	1.00	.	1
		Total	1.00	.000	2
	Total	1	1.00	.000	2
		2	1.00	.000	3
		3	1.00	.000	3
		Total	1.00	.000	8
8	0	2	1.00	.000	2
		3	1.00	.000	3
		Total	1.00	.000	5
	1	2	1.00	.000	3
		3	1.00	.	1
		Total	1.00	.000	4
	Total	2	1.00	.000	5
		3	1.00	.000	4
		Total	1.00	.000	9
9	0	3	1.00	.	1
		Total	1.00	.	1
	Total	3	1.00	.	1
		Total	1.00	.	1
Total	0	1	1.71	.756	7
		2	1.48	.653	25

			3	1.21	.579	14
			Total	1.43	.655	46
		1	1	1.54	.658	24
			2	1.42	.604	36
			3	1.47	.717	17
			Total	1.47	.640	77
		2	1	2.22	.833	9
			2	1.85	.745	20
			3	1.70	.823	10
			Total	1.90	.788	39
		3	1	2.40	.548	5
			2	1.71	.951	7
			3	2.00	1.414	2
			Total	2.00	.877	14
		Total	1	1.80	.757	45
			2	1.56	.692	88
			3	1.47	.735	43
			Total	1.60	.726	176

Table 82. Descriptive Statistics - Self-experimentation helps?

(AutoP)

Descriptive Statistics - Relationships helps?(RelP)

Descriptive Statistics

Dependent Variable: Relationships helps?

Times experts consults	Number of helper friends	Same career helper persons	Other career Helper persons	Mean	Std. Deviation	N
0	0	0	1	1.00	.	1
			2	2.00	.	1
			3	1.50	.707	2
			4	1.50	.577	4
			6	1.00	.	1
			Total	1.44	.527	9
		1	3	1.50	.707	2
			4	2.00	.	1
			5	2.00	.000	2
			6	2.00	.	1
			Total	1.83	.408	6
		2	2	1.00	.000	2
			3	1.00	.	1
			4	2.00	1.000	3
			Total	1.50	.837	6

		3	1.21	.579	14
		Total	1.43	.655	46
	1	1	1.54	.658	24
		2	1.42	.604	36
		3	1.47	.717	17
		Total	1.47	.640	77
	2	1	2.22	.833	9
		2	1.85	.745	20
		3	1.70	.823	10
		Total	1.90	.788	39
	3	1	2.40	.548	5
		2	1.71	.951	7
		3	2.00	1.414	2
		Total	2.00	.877	14
	Total	1	1.80	.757	45
		2	1.56	.692	88
		3	1.47	.735	43
		Total	1.60	.726	176

Table 82. Descriptive Statistics - Self-experimentation helps?

(AutoP)

Descriptive Statistics - Relationships helps?(RelP)

Descriptive Statistics

Dependent Variable: Relationships helps?

Times experts consults	Number of helper friends	Same career helper persons	Other career Helper persons	Mean	Std. Deviation	N
0	0	0	1	1.00	.	1
			2	2.00	.	1
			3	1.50	.707	2
			4	1.50	.577	4
			6	1.00	.	1
			Total	1.44	.527	9
		1	3	1.50	.707	2
			4	2.00	.	1
			5	2.00	.000	2
			6	2.00	.	1
			Total	1.83	.408	6
		2	2	1.00	.000	2
			3	1.00	.	1
			4	2.00	1.000	3
			Total	1.50	.837	6

	3	2	2.00	.	1
		3	1.00	.000	2
		4	1.00	.	1
		6	3.00	.	1
		Total	1.60	.894	5
	4	3	2.00	.	1
		Total	2.00	.	1
	5	4	1.00	.	1
		6	1.00	.	1
		Total	1.00	.000	2
	Total	1	1.00	.	1
		2	1.50	.577	4
		3	1.38	.518	8
		4	1.60	.699	10
		5	2.00	.000	2
		6	1.75	.957	4
		Total	1.55	.632	29
1	0	2	3.00	.	1
		3	2.00	.	1
		5	2.00	.	1
		Total	2.33	.577	3
	1	2	1.50	.707	2
		3	1.67	.577	3
		4	1.50	.707	2
		Total	1.57	.535	7
	2	1	1.50	.707	2
		2	2.00	.000	2
		3	1.67	1.155	3
		4	1.67	.577	3
		5	2.00	.	1
		6	1.00	.	1
		Total	1.67	.651	12
	3	2	1.00	.000	3
		4	2.00	1.000	5
		5	2.00	1.414	2
		7	1.00	.	1
		Total	1.64	.924	11
	4	1	1.00	.	1
		2	1.00	.	1
		3	2.50	.707	2
		6	1.00	.	1
		Total	1.60	.894	5
	5	1	1.00	.	1
		4	1.00	.	1
		Total	1.00	.000	2
	Total	1	1.25	.500	4
		2	1.56	.726	9
		3	1.89	.782	9
		4	1.73	.786	11
		5	2.00	.816	4
		6	1.00	.000	2

		7	1.00	.	1
		Total	1.65	.736	40
2	0	4	2.00	.	1
		5	1.00	.	1
		Total	1.50	.707	2
	1	1	1.00	.	1
		3	2.00	.	1
		4	1.33	.577	3
		Total	1.40	.548	5
	2	2	2.00	.	1
		5	1.00	.	1
		6	1.00	.	1
		Total	1.33	.577	3
	3	2	1.00	.	1
		3	3.00	.	1
		4	2.00	1.414	2
		5	1.50	.707	2
		6	2.00	.	1
		Total	1.86	.900	7
	5	4	2.00	.	1
		Total	2.00	.	1
	6	4	2.00	.	1
		Total	2.00	.	1
	7	4	2.00	.	1
		Total	2.00	.	1
	Total	1	1.00	.	1
		2	1.50	.707	2
		3	2.50	.707	2
		4	1.78	.667	9
		5	1.25	.500	4
		6	1.50	.707	2
		Total	1.65	.671	20
3	1	1	1.00	.	1
		2	2.00	.	1
		Total	1.50	.707	2
	2	3	1.00	.000	2
		Total	1.00	.000	2
	5	2	3.00	.	1
		Total	3.00	.	1
	7	4	3.00	.	1
		Total	3.00	.	1
	Total	1	1.00	.	1
		2	2.50	.707	2
		3	1.00	.000	2
		4	3.00	.	1
		Total	1.83	.983	6
4	2	2	2.00	.	1

		Total	2.00	.	1
	6	4	2.00	.	1
		Total	2.00	.	1
	7	4	1.00	.	1
		Total	1.00	.	1
	Total	2	2.00	.	1
		4	1.50	.707	2
		Total	1.67	.577	3
Total	0	1	1.00	.	1
		2	2.50	.707	2
		3	1.67	.577	3
		4	1.60	.548	5
		5	1.50	.707	2
		6	1.00	.	1
		Total	1.64	.633	14
	1	1	1.00	.000	2
		2	1.67	.577	3
		3	1.67	.516	6
		4	1.50	.548	6
		5	2.00	.000	2
		6	2.00	.	1
		Total	1.60	.503	20
	2	1	1.50	.707	2
		2	1.67	.516	6
		3	1.33	.816	6
		4	1.83	.753	6
		5	1.50	.707	2
		6	1.00	.000	2
		Total	1.54	.658	24
	3	2	1.20	.447	5
		3	1.67	1.155	3
		4	1.88	.991	8
		5	1.75	.957	4
		6	2.50	.707	2
		7	1.00	.	1
		Total	1.70	.876	23
	4	1	1.00	.	1
		2	1.00	.	1
		3	2.33	.577	3
		6	1.00	.	1
		Total	1.67	.816	6
	5	1	1.00	.	1
		2	3.00	.	1
		4	1.33	.577	3
		6	1.00	.	1
		Total	1.50	.837	6
	6	4	2.00	.000	2
		Total	2.00	.000	2
	7	4	2.00	1.000	3
		Total	2.00	1.000	3
	Total	1	1.14	.378	7

			2	1.67	.686	18
			3	1.67	.730	21
			4	1.73	.719	33
			5	1.70	.675	10
			6	1.50	.756	8
			7	1.00	.	1
			Total	1.63	.694	98
1	0	1	1	2.00	.	1
			4	2.00	.	1
			Total	2.00	.000	2
		2	2	3.00	.	1
			Total	3.00	.	1
		3	1	2.00	1.414	2
			2	1.00	.	1
			5	1.00	.	1
			Total	1.50	1.000	4
		Total	1	2.00	1.000	3
			2	2.00	1.414	2
			4	2.00	.	1
			5	1.00	.	1
			Total	1.86	.900	7
	1	0	2	3.00	.	1
			Total	3.00	.	1
		1	1	1.00	.	1
			2	1.67	.577	3
			3	1.00	.000	2
			4	3.00	.	1
			Total	1.57	.787	7
		2	2	1.33	.577	3
			4	1.00	.	1
			Total	1.25	.500	4
		3	2	1.00	.	1
			3	2.00	.	1
			4	2.00	.000	2
			Total	1.75	.500	4
		4	3	1.50	.707	2
			Total	1.50	.707	2
		5	3	1.50	.707	2
			Total	1.50	.707	2
		6	3	1.50	.707	2
			4	1.00	.	1
			Total	1.33	.577	3
		Total	1	1.00	.	1
			2	1.63	.744	8
			3	1.44	.527	9
			4	1.80	.837	5
			Total	1.57	.662	23
	2	1	2	1.33	.577	3
			4	1.00	.	1
			Total	1.25	.500	4

	2	3	1.67	.577	3
		4	3.00	.	1
		Total	2.00	.816	4
	3	2	1.00	.	1
		3	1.67	.577	3
		4	1.00	.	1
		Total	1.40	.548	5
	4	3	2.00	.	1
		Total	2.00	.	1
	5	2	1.00	.	1
		4	1.00	.000	2
		Total	1.00	.000	3
	6	2	1.00	.	1
		3	1.00	.	1
		4	1.00	.	1
		Total	1.00	.000	3
	Total	2	1.17	.408	6
		3	1.63	.518	8
		4	1.33	.816	6
		Total	1.40	.598	20
3	1	2	1.00	.	1
		3	3.00	.	1
		Total	2.00	1.414	2
	2	2	3.00	.	1
		5	2.00	.	1
		Total	2.50	.707	2
	3	1	1.00	.	1
		Total	1.00	.	1
	4	2	2.00	.	1
		3	3.00	.	1
		Total	2.50	.707	2
	5	2	1.00	.	1
		Total	1.00	.	1
	Total	1	1.00	.	1
		2	1.75	.957	4
		3	3.00	.000	2
		5	2.00	.	1
		Total	2.00	.926	8
4	2	3	2.00	.	1
		4	1.00	.	1
		Total	1.50	.707	2
	4	3	3.00	.	1
		Total	3.00	.	1
	5	2	1.00	.	1
		Total	1.00	.	1
	7	4	3.00	.	1
		Total	3.00	.	1
	Total	2	1.00	.	1
		3	2.50	.707	2
		4	2.00	1.414	2
		Total	2.00	1.000	5
Total	0	2	3.00	.	1
		Total	3.00	.	1
	1	1	1.50	.707	2

			2	1.43	.535	7
			3	1.67	1.155	3
			4	2.00	1.000	3
			Total	1.60	.737	15
		2	2	2.00	1.000	5
			3	1.75	.500	4
			4	1.67	1.155	3
			5	2.00	.	1
			Total	1.85	.801	13
		3	1	1.67	1.155	3
			2	1.00	.000	3
			3	1.75	.500	4
			4	1.67	.577	3
			5	1.00	.	1
			Total	1.50	.650	14
		4	2	2.00	.	1
			3	2.20	.837	5
			Total	2.17	.753	6
		5	2	1.00	.000	3
			3	1.50	.707	2
			4	1.00	.000	2
			Total	1.14	.378	7
		6	2	1.00	.	1
			3	1.33	.577	3
			4	1.00	.000	2
			Total	1.17	.408	6
		7	4	3.00	.	1
			Total	3.00	.	1
		Total	1	1.60	.894	5
			2	1.52	.750	21
			3	1.76	.700	21
			4	1.64	.842	14
			5	1.50	.707	2
			Total	1.63	.747	63
2	0	1	2	3.00	.	1
			Total	3.00	.	1
		3	3	1.00	.	1
			Total	1.00	.	1
		Total	2	3.00	.	1
			3	1.00	.	1
			Total	2.00	1.414	2
	1	1	2	2.00	.	1
			3	3.00	.	1
			Total	2.50	.707	2
		2	3	1.00	.	1
			Total	1.00	.	1
		5	2	1.00	.	1
			Total	1.00	.	1
		Total	2	1.50	.707	2
			3	2.00	1.414	2
			Total	1.75	.957	4
	2	0	3	2.00	.	1
			Total	2.00	.	1
		1	3	1.00	.	1

			Total	1.00	.	1
		4	4	1.00	.	1
			Total	1.00	.	1
		5	4	1.00	.	1
			Total	1.00	.	1
		Total	3	1.50	.707	2
			4	1.00	.000	2
			Total	1.25	.500	4
	3	0	3	1.00	.	1
			Total	1.00	.	1
		1	4	1.00	.	1
			Total	1.00	.	1
		3	3	1.00	.	1
			Total	1.00	.	1
		Total	3	1.00	.000	2
			4	1.00	.	1
			Total	1.00	.000	3
	Total	0	3	1.50	.707	2
			Total	1.50	.707	2
		1	2	2.50	.707	2
			3	2.00	1.414	2
			4	1.00	.	1
			Total	2.00	1.000	5
		2	3	1.00	.	1
			Total	1.00	.	1
		3	3	1.00	.000	2
			Total	1.00	.000	2
		4	4	1.00	.	1
			Total	1.00	.	1
		5	2	1.00	.	1
			4	1.00	.	1
			Total	1.00	.000	2
		Total	2	2.00	1.000	3
			3	1.43	.787	7
			4	1.00	.000	3
			Total	1.46	.776	13
3	1	1	3	1.00	.	1
			Total	1.00	.	1
		4	3	1.00	.	1
			Total	1.00	.	1
		Total	3	1.00	.000	2
			Total	1.00	.000	2
	Total	1	3	1.00	.	1
			Total	1.00	.	1
		4	3	1.00	.	1
			Total	1.00	.	1
		Total	3	1.00	.000	2
			Total	1.00	.000	2
Total	0	0	1	1.00	.	1
			2	2.00	.	1
			3	1.50	.707	2

		4	1.50	.577	4
		6	1.00	.	1
		Total	1.44	.527	9
	1	1	2.00	.	1
		2	3.00	.	1
		3	1.50	.707	2
		4	2.00	.000	2
		5	2.00	.000	2
		6	2.00	.	1
		Total	2.00	.500	9
	2	2	1.67	1.155	3
		3	1.00	.	1
		4	2.00	1.000	3
		Total	1.71	.951	7
	3	1	2.00	1.414	2
		2	1.50	.707	2
		3	1.00	.000	3
		4	1.00	.	1
		5	1.00	.	1
		6	3.00	.	1
		Total	1.50	.850	10
	4	3	2.00	.	1
		Total	2.00	.	1
	5	4	1.00	.	1
		6	1.00	.	1
		Total	1.00	.000	2
	Total	1	1.75	.957	4
		2	1.86	.900	7
		3	1.33	.500	9
		4	1.64	.674	11
		5	1.67	.577	3
		6	1.75	.957	4
		Total	1.63	.714	38
1	0	2	3.00	.000	2
		3	2.00	.	1
		5	2.00	.	1
		Total	2.50	.577	4
	1	1	1.00	.	1
		2	1.67	.516	6
		3	1.57	.787	7
		4	2.00	1.000	3
		Total	1.65	.702	17
	2	1	1.50	.707	2
		2	1.60	.548	5
		3	1.50	1.000	4
		4	1.50	.577	4
		5	2.00	.	1
		6	1.00	.	1

		Total	1.53	.624	17
	3	2	1.00	.000	4
		3	2.00	.	1
		4	2.00	.816	7
		5	2.00	1.414	2
		7	1.00	.	1
		Total	1.67	.816	15
	4	1	1.00	.	1
		2	1.00	.	1
		3	1.80	.837	5
		6	1.00	.	1
		Total	1.50	.756	8
	5	1	1.00	.	1
		2	1.00	.	1
		3	1.50	.707	2
		4	1.00	.	1
		Total	1.20	.447	5
	6	3	1.50	.707	2
		4	1.00	.	1
		Total	1.33	.577	3
	Total	1	1.20	.447	5
		2	1.58	.692	19
		3	1.64	.727	22
		4	1.75	.775	16
		5	2.00	.816	4
		6	1.00	.000	2
		7	1.00	.	1
		Total	1.61	.712	69
2	0	3	2.00	.	1
		4	2.00	.	1
		5	1.00	.	1
		Total	1.67	.577	3
	1	1	1.00	.	1
		2	1.33	.577	3
		3	1.50	.707	2
		4	1.25	.500	4
		Total	1.30	.483	10
	2	2	2.00	.	1
		3	1.67	.577	3
		4	3.00	.	1
		5	1.00	.	1
		6	1.00	.	1
		Total	1.71	.756	7
	3	2	1.00	.000	2
		3	2.00	.816	4
		4	1.67	1.155	3
		5	1.50	.707	2
		6	2.00	.	1
		Total	1.67	.778	12
	4	3	2.00	.	1
		4	1.00	.	1

		Total	1.50	.707	2
	5	2	1.00	.	1
		4	1.25	.500	4
		Total	1.20	.447	5
	6	2	1.00	.	1
		3	1.00	.	1
		4	1.50	.707	2
		Total	1.25	.500	4
	7	4	2.00	.	1
		Total	2.00	.	1
	Total	1	1.00	.	1
		2	1.25	.463	8
		3	1.75	.622	12
		4	1.53	.717	17
		5	1.25	.500	4
		6	1.50	.707	2
		Total	1.50	.629	44
3	0	3	1.00	.	1
		Total	1.00	.	1
	1	1	1.00	.	1
		2	1.50	.707	2
		3	3.00	.	1
		4	1.00	.	1
		Total	1.60	.894	5
	2	2	3.00	.	1
		3	1.00	.000	2
		5	2.00	.	1
		Total	1.75	.957	4
	3	1	1.00	.	1
		3	1.00	.	1
		Total	1.00	.000	2
	4	2	2.00	.	1
		3	3.00	.	1
		Total	2.50	.707	2
	5	2	2.00	1.414	2
		Total	2.00	1.414	2
	7	4	3.00	.	1
		Total	3.00	.	1
	Total	1	1.00	.000	2
		2	2.00	.894	6
		3	1.67	1.033	6
		4	2.00	1.414	2
		5	2.00	.	1
		Total	1.76	.903	17
4	2	2	2.00	.	1
		3	2.00	.	1
		4	1.00	.	1
		Total	1.67	.577	3
	4	3	3.00	.	1
		Total	3.00	.	1
	5	2	1.00	.	1
		Total	1.00	.	1

	6	4	2.00	.	1
		Total	2.00	.	1
	7	4	2.00	1.414	2
		Total	2.00	1.414	2
	Total	2	1.50	.707	2
		3	2.50	.707	2
		4	1.75	.957	4
		Total	1.88	.835	8
Total	0	1	1.00	.	1
		2	2.67	.577	3
		3	1.60	.548	5
		4	1.60	.548	5
		5	1.50	.707	2
		6	1.00	.	1
		Total	1.71	.686	17
	1	1	1.25	.500	4
		2	1.67	.651	12
		3	1.67	.778	12
		4	1.60	.699	10
		5	2.00	.000	2
		6	2.00	.	1
		Total	1.63	.662	41
	2	1	1.50	.707	2
		2	1.82	.751	11
		3	1.45	.688	11
		4	1.78	.833	9
		5	1.67	.577	3
		6	1.00	.000	2
		Total	1.63	.714	38
	3	1	1.67	1.155	3
		2	1.13	.354	8
		3	1.56	.726	9
		4	1.82	.874	11
		5	1.60	.894	5
		6	2.50	.707	2
		7	1.00	.	1
		Total	1.59	.785	39
	4	1	1.00	.	1
		2	1.50	.707	2
		3	2.11	.782	9
		4	1.00	.	1
		6	1.00	.	1
		Total	1.79	.802	14
	5	1	1.00	.	1
		2	1.40	.894	5
		3	1.50	.707	2
		4	1.17	.408	6
		6	1.00	.	1
		Total	1.27	.594	15
	6	2	1.00	.	1
		3	1.33	.577	3

		4	1.50	.577	4
		Total	1.38	.518	8
	7	4	2.25	.957	4
		Total	2.25	.957	4
	Total	1	1.33	.651	12
		2	1.62	.731	42
		3	1.65	.716	51
		4	1.66	.745	50
		5	1.67	.651	12
		6	1.50	.756	8
		7	1.00	.	1
		Total	1.61	.716	176

Table 83. Descriptive Statistics - Relashionships helps?

(RelP)

Descriptive Statistics - Importance given helps?(ImpP)

Descriptive Statistics

Dependent Variable: Importance given helps?

Homework through CWIS delivery importance	Homeworks not delivered	CWIS name (0-webtec, 1-BB)	Mean	Std. Deviation	N
1	0	0	1.60	.645	25
		Total	1.60	.645	25
	1	0	1.44	.660	34
		1	1.50	.548	6
		Total	1.45	.639	40
	2	1	1.00	.	1
		Total	1.00	.	1
	Total	0	1.51	.653	59
		1	1.43	.535	7
		Total	1.50	.639	66
2	0	0	1.00	.000	3
		1	1.63	.518	8
		Total	1.45	.522	11
	1	0	1.67	.577	3
		1	1.67	.816	15
		Total	1.67	.767	18
	2	1	1.50	.632	16
		Total	1.50	.632	16
	3	1	1.00	.000	4
		Total	1.00	.000	4
	Total	0	1.33	.516	6
		1	1.53	.667	43
		Total	1.51	.649	49

	4	1.50	.577	4
	Total	1.38	.518	8
7	4	2.25	.957	4
	Total	2.25	.957	4
Total	1	1.33	.651	12
	2	1.62	.731	42
	3	1.65	.716	51
	4	1.66	.745	50
	5	1.67	.651	12
	6	1.50	.756	8
	7	1.00	.	1
	Total	1.61	.716	176

Table 83. Descriptive Statistics - Relashionships helps?

(RelP)

Descriptive Statistics - Importance given helps?(ImpP)

Descriptive Statistics

Dependent Variable: Importance given helps?

Homework through CWIS delivery importance	Homeworks not delivered	CWIS name (0-webtec, 1-BB)	Mean	Std. Deviation	N
1	0	0	1.60	.645	25
		Total	1.60	.645	25
	1	0	1.44	.660	34
		1	1.50	.548	6
		Total	1.45	.639	40
	2	1	1.00	.	1
		Total	1.00	.	1
	Total	0	1.51	.653	59
		1	1.43	.535	7
		Total	1.50	.639	66
2	0	0	1.00	.000	3
		1	1.63	.518	8
		Total	1.45	.522	11
	1	0	1.67	.577	3
		1	1.67	.816	15
		Total	1.67	.767	18
	2	1	1.50	.632	16
		Total	1.50	.632	16
	3	1	1.00	.000	4
		Total	1.00	.000	4
	Total	0	1.33	.516	6
		1	1.53	.667	43
		Total	1.51	.649	49

3	0	1	1.50	.707	10
		Total	1.50	.707	10
	1	1	1.37	.684	19
		Total	1.37	.684	19
	2	1	1.68	.646	22
		Total	1.68	.646	22
	3	1	1.90	.876	10
		Total	1.90	.876	10
	Total	1	1.59	.716	61
		Total	1.59	.716	61
Total	0	0	1.54	.637	28
		1	1.56	.616	18
		Total	1.54	.622	46
	1	0	1.46	.650	37
		1	1.50	.716	40
		Total	1.48	.681	77
	2	1	1.59	.637	39
		Total	1.59	.637	39
	3	1	1.64	.842	14
		Total	1.64	.842	14
	Total	0	1.49	.640	65
		1	1.56	.683	111
		Total	1.53	.667	176

Table 84. Descriptive Statistics - Importance given helps?

(ImpP)

Descriptive Statistics - Comments on using helps?(UsoP)

Descriptive Statistics

Dependent Variable: Comments on using helps?

Use comments	Off line total time	CWIS name (0-webtec, 1-BB)	Failure times	Mean	Std. Deviation	N
0	0	0	1	1.00	.	1
			3	1.00	.	1
			4	3.00	.	1
			5	1.00	.	1
			Total	1.50	1.000	4
		1	0	1.40	.894	5
			1	1.50	1.000	4
			2	1.00	.000	2
			3	3.00	.	1
			Total	1.50	.905	12

3	0	1	1.50	.707	10
		Total	1.50	.707	10
	1	1	1.37	.684	19
		Total	1.37	.684	19
	2	1	1.68	.646	22
		Total	1.68	.646	22
	3	1	1.90	.876	10
		Total	1.90	.876	10
	Total	1	1.59	.716	61
		Total	1.59	.716	61
Total	0	0	1.54	.637	28
		1	1.56	.616	18
		Total	1.54	.622	46
	1	0	1.46	.650	37
		1	1.50	.716	40
		Total	1.48	.681	77
	2	1	1.59	.637	39
		Total	1.59	.637	39
	3	1	1.64	.842	14
		Total	1.64	.842	14
	Total	0	1.49	.640	65
		1	1.56	.683	111
		Total	1.53	.667	176

Table 84. Descriptive Statistics - Importance given helps?

(ImpP)

Descriptive Statistics - Comments on using helps?(UsoP)

Descriptive Statistics

Dependent Variable: Comments on using helps?

Use comments	Off line total time	CWIS name (0-webtec, 1-BB)	Failure times	Mean	Std. Deviation	N
0	0	0	1	1.00	.	1
			3	1.00	.	1
			4	3.00	.	1
			5	1.00	.	1
			Total	1.50	1.000	4
		1	0	1.40	.894	5
			1	1.50	1.000	4
			2	1.00	.000	2
			3	3.00	.	1
			Total	1.50	.905	12

	Total	0	1.40	.894	5
		1	1.40	.894	5
		2	1.00	.000	2
		3	2.00	1.414	2
		4	3.00	.	1
		5	1.00	.	1
		Total	1.50	.894	16
1	0	0	1.00	.000	2
		1	1.50	1.000	4
		2	1.00	.000	2
		3	1.00	.	1
		4	1.00	.	1
		5	1.00	.	1
		6	1.00	.	1
		7	1.00	.	1
		Total	1.15	.555	13
	1	0	1.18	.603	11
		1	1.11	.459	19
		2	1.00	.000	7
		3	1.00	.000	3
		Total	1.10	.441	40
	Total	0	1.15	.555	13
		1	1.17	.576	23
		2	1.00	.000	9
		3	1.00	.000	4
		4	1.00	.	1
		5	1.00	.	1
		6	1.00	.	1
		7	1.00	.	1
		Total	1.11	.467	53
Total	0	0	1.00	.000	2
		1	1.40	.894	5
		2	1.00	.000	2
		3	1.00	.000	2
		4	2.00	1.414	2
		5	1.00	.000	2
		6	1.00	.	1
		7	1.00	.	1
		Total	1.24	.664	17
	1	0	1.25	.683	16
		1	1.17	.576	23
		2	1.00	.000	9
		3	1.50	1.000	4
		Total	1.19	.595	52
	Total	0	1.22	.647	18

			1	1.21	.630	28
			2	1.00	.000	11
			3	1.33	.816	6
			4	2.00	1.414	2
			5	1.00	.000	2
			6	1.00	.	1
			7	1.00	.	1
			Total	1.20	.608	69
1	0	0	0	2.00	.000	2
			1	2.00	.000	4
			2	2.00	.000	2
			3	2.00	.000	3
			4	2.00	.000	3
			5	2.00	.000	2
			7	2.00	.	1
			Total	2.00	.000	17
		1	0	2.00	.000	2
			1	2.00	.000	6
			3	2.00	.	1
			Total	2.00	.000	9
		Total	0	2.00	.000	4
			1	2.00	.000	10
			2	2.00	.000	2
			3	2.00	.000	4
			4	2.00	.000	3
			5	2.00	.000	2
			7	2.00	.	1
			Total	2.00	.000	26
	1	0	0	2.00	.	1
			1	2.00	.000	5
			2	2.00	.000	4
			3	2.00	.000	3
			4	2.00	.000	2
			Total	2.00	.000	15
		1	0	2.00	.000	5
			1	2.00	.000	10
			2	2.00	.000	7
			5	2.00	.	1
			Total	2.00	.000	23
		Total	0	2.00	.000	6
			1	2.00	.000	15
			2	2.00	.000	11
			3	2.00	.000	3
			4	2.00	.000	2
			5	2.00	.	1

			Total	2.00	.000	38
	Total	0	0	2.00	.000	3
			1	2.00	.000	9
			2	2.00	.000	6
			3	2.00	.000	6
			4	2.00	.000	5
			5	2.00	.000	2
			7	2.00	.	1
			Total	2.00	.000	32
		1	0	2.00	.000	7
			1	2.00	.000	16
			2	2.00	.000	7
			3	2.00	.	1
			5	2.00	.	1
			Total	2.00	.000	32
		Total	0	2.00	.000	10
			1	2.00	.000	25
			2	2.00	.000	13
			3	2.00	.000	7
			4	2.00	.000	5
			5	2.00	.000	3
			7	2.00	.	1
			Total	2.00	.000	64
2	0	0	0	3.00	.	1
			1	3.00	.000	3
			3	3.00	.000	2
			6	3.00	.	1
			Total	3.00	.000	7
		1	0	2.33	1.033	6
			1	3.00	.000	7
			2	3.00	.	1
			3	3.00	.	1
			Total	2.73	.704	15
		Total	0	2.43	.976	7
			1	3.00	.000	10
			2	3.00	.	1
			3	3.00	.000	3
			6	3.00	.	1
			Total	2.82	.588	22
	1	0	0	1.00	.	1
			1	2.33	1.155	3
			2	3.00	.000	2
			4	3.00	.000	2
			6	3.00	.	1
			Total	2.56	.882	9
		1	0	3.00	.000	7

			1	3.00	.000	2
			2	2.33	1.155	3
			Total	2.83	.577	12
		Total	0	2.75	.707	8
			1	2.60	.894	5
			2	2.60	.894	5
			4	3.00	.000	2
			6	3.00	.	1
			Total	2.71	.717	21
	Total	0	0	2.00	1.414	2
			1	2.67	.816	6
			2	3.00	.000	2
			3	3.00	.000	2
			4	3.00	.000	2
			6	3.00	.000	2
			Total	2.75	.683	16
		1	0	2.69	.751	13
			1	3.00	.000	9
			2	2.50	1.000	4
			3	3.00	.	1
			Total	2.78	.641	27
		Total	0	2.60	.828	15
			1	2.87	.516	15
			2	2.67	.816	6
			3	3.00	.000	3
			4	3.00	.000	2
			6	3.00	.000	2
			Total	2.77	.649	43
Total	0	0	0	2.33	.577	3
			1	2.25	.707	8
			2	2.00	.000	2
			3	2.17	.753	6
			4	2.25	.500	4
			5	1.67	.577	3
			6	3.00	.	1
			7	2.00	.	1
			Total	2.18	.612	28
		1	0	1.92	.954	13
			1	2.29	.772	17
			2	1.67	1.155	3
			3	2.67	.577	3
			Total	2.14	.867	36
		Total	0	2.00	.894	16
			1	2.28	.737	25
			2	1.80	.837	5
			3	2.33	.707	9
			4	2.25	.500	4

		5	1.67	.577	3
		6	3.00	.	1
		7	2.00	.	1
		Total	2.16	.761	64
1	0	0	1.25	.500	4
		1	1.92	.793	12
		2	2.00	.756	8
		3	1.75	.500	4
		4	2.20	.837	5
		5	1.00	.	1
		6	2.00	1.414	2
		7	1.00	.	1
		Total	1.84	.764	37
	1	0	1.91	.900	23
		1	1.52	.677	31
		2	1.65	.702	17
		3	1.00	.000	3
		5	2.00	.	1
		Total	1.65	.762	75
	Total	0	1.81	.879	27
		1	1.63	.725	43
		2	1.76	.723	25
		3	1.43	.535	7
		4	2.20	.837	5
		5	1.50	.707	2
		6	2.00	1.414	2
		7	1.00	.	1
		Total	1.71	.764	112
Total	0	0	1.71	.756	7
		1	2.05	.759	20
		2	2.00	.667	10
		3	2.00	.667	10
		4	2.22	.667	9
		5	1.50	.577	4
		6	2.33	1.155	3
		7	1.50	.707	2
		Total	1.98	.718	65
	1	0	1.92	.906	36
		1	1.79	.798	48
		2	1.65	.745	20
		3	1.83	.983	6
		5	2.00	.	1
		Total	1.81	.826	111
	Total	0	1.88	.879	43
		1	1.87	.790	68
		2	1.77	.728	30
		3	1.94	.772	16

4	2.22	.667	9
5	1.60	.548	5
6	2.33	1.155	3
7	1.50	.707	2
Total	1.88	.790	176

Table 85. Descriptive Statistics - Comments on using helps?

(UsoP)

Descriptive Statistics - Comments on Technical service helps?(TecP)

Descriptive Statistics

Dependent Variable: Comments on technical service helps?

Tech service comments	Complains number	Number of users	CWIS name (0-webtec, 1-BB)	Mean	Std. Deviation	N
0	0	0	0	1.14	.535	14
			Total	1.14	.535	14
		1	0	1.00	.000	11
			Total	1.00	.000	11
		Total	0	1.08	.400	25
			Total	1.08	.400	25
	1	0	1	1.08	.408	24
			Total	1.08	.408	24
		1	1	1.40	.828	15
			Total	1.40	.828	15
		Total	1	1.21	.615	39
			Total	1.21	.615	39
	Total	0	0	1.14	.535	14
			1	1.08	.408	24
			Total	1.11	.453	38
		1	0	1.00	.000	11
			1	1.40	.828	15
			Total	1.23	.652	26
		Total	0	1.08	.400	25
			1	1.21	.615	39
			Total	1.16	.541	64
1	0	0	0	2.00	.000	13
			Total	2.00	.000	13
		1	0	2.00	.000	15
			Total	2.00	.000	15
		Total	0	2.00	.000	28
			Total	2.00	.000	28
	1	0	1	2.00	.000	21

4	2.22	.667	9
5	1.60	.548	5
6	2.33	1.155	3
7	1.50	.707	2
Total	1.88	.790	176

Table 85. Descriptive Statistics - Comments on using helps?

(UsoP)

Descriptive Statistics - Comments on Technical service helps?(TecP)

Descriptive Statistics

Dependent Variable: Comments on technical service helps?

Tech service comments	Complains number	Number of users	CWIS name (0-webtec, 1-BB)	Mean	Std. Deviation	N
0	0	0	0	1.14	.535	14
			Total	1.14	.535	14
		1	0	1.00	.000	11
			Total	1.00	.000	11
		Total	0	1.08	.400	25
			Total	1.08	.400	25
	1	0	1	1.08	.408	24
			Total	1.08	.408	24
		1	1	1.40	.828	15
			Total	1.40	.828	15
		Total	1	1.21	.615	39
			Total	1.21	.615	39
	Total	0	0	1.14	.535	14
			1	1.08	.408	24
			Total	1.11	.453	38
		1	0	1.00	.000	11
			1	1.40	.828	15
			Total	1.23	.652	26
		Total	0	1.08	.400	25
			1	1.21	.615	39
			Total	1.16	.541	64
1	0	0	0	2.00	.000	13
			Total	2.00	.000	13
		1	0	2.00	.000	15
			Total	2.00	.000	15
		Total	0	2.00	.000	28
			Total	2.00	.000	28
	1	0	1	2.00	.000	21

			Total	2.00	.000	21
		1	1	2.00	.000	15
			Total	2.00	.000	15
		Total	1	2.00	.000	36
			Total	2.00	.000	36
	Total	0	0	2.00	.000	13
			1	2.00	.000	21
			Total	2.00	.000	34
		1	0	2.00	.000	15
			1	2.00	.000	15
			Total	2.00	.000	30
		Total	0	2.00	.000	28
			1	2.00	.000	36
			Total	2.00	.000	64
2	0	0	0	3.00	.000	11
			Total	3.00	.000	11
		1	0	1.00	.	1
			Total	1.00	.	1
		Total	0	2.83	.577	12
			Total	2.83	.577	12
	1	0	1	3.00	.000	22
			Total	3.00	.000	22
		1	1	3.00	.000	14
			Total	3.00	.000	14
		Total	1	3.00	.000	36
			Total	3.00	.000	36
	Total	0	0	3.00	.000	11
			1	3.00	.000	22
			Total	3.00	.000	33
		1	0	1.00	.	1
			1	3.00	.000	14
			Total	2.87	.516	15
		Total	0	2.83	.577	12
			1	3.00	.000	36
			Total	2.96	.289	48
Total	0	0	0	1.97	.822	38
			Total	1.97	.822	38
		1	0	1.56	.506	27
			Total	1.56	.506	27
		Total	0	1.80	.733	65
			Total	1.80	.733	65
	1	0	1	2.00	.835	67
			Total	2.00	.835	67
		1	1	2.11	.813	44
			Total	2.11	.813	44
		Total	1	2.05	.824	111

			Mean	Std. Deviation	N
		Total	2.05	.824	111
Total	0	0	1.97	.822	38
		1	2.00	.835	67
		Total	1.99	.826	105
	1	0	1.56	.506	27
		1	2.11	.813	44
		Total	1.90	.759	71
	Total	0	1.80	.733	65
		1	2.05	.824	111
		Total	1.95	.799	176

Table 86. Descriptive Statistics - Comments on Technical

service helps? (TecP)

Descriptive Statistics - Self-confidence helps?(ConfP)

Descriptive Statistics

Dependent Variable: Self-confidence helps?

Expertise	Socialship	Career	Age	Gender	Mean	Std. Deviation	N
1	0	1	1	2	2.00	.	1
				Total	2.00	.	1
			2	1	1.00	.000	2
				2	2.00	.	1
				Total	1.33	.577	3
			Total	1	1.00	.000	2
				2	2.00	.000	2
				Total	1.50	.577	4
		3	3	1	1.00	.	1
				Total	1.00	.	1
			Total	1	1.00	.	1
				Total	1.00	.	1
		Total	1	2	2.00	.	1
				Total	2.00	.	1
			2	1	1.00	.000	2
				2	2.00	.	1
				Total	1.33	.577	3
			3	1	1.00	.	1
				Total	1.00	.	1
			Total	1	1.00	.000	3
				2	2.00	.000	2
				Total	1.40	.548	5
	1	1	1	1	1.00	.000	3
				Total	1.00	.000	3
			2	1	1.00	.	1
				2	2.00	.	1

		Total	2.05	.824	111
Total	0	0	1.97	.822	38
		1	2.00	.835	67
		Total	1.99	.826	105
	1	0	1.56	.506	27
		1	2.11	.813	44
		Total	1.90	.759	71
	Total	0	1.80	.733	65
		1	2.05	.824	111
		Total	1.95	.799	176

Table 86. Descriptive Statistics - Comments on Technical

service helps? (TecP)

Descriptive Statistics - Self-confidence helps?(ConfP)

Descriptive Statistics

Dependent Variable: Self-confidence helps?

Expertise	Socialship	Career	Age	Gender	Mean	Std. Deviation	N
1	0	1	1	2	2.00	.	1
				Total	2.00	.	1
			2	1	1.00	.000	2
				2	2.00	.	1
				Total	1.33	.577	3
			Total	1	1.00	.000	2
				2	2.00	.000	2
				Total	1.50	.577	4
		3	3	1	1.00	.	1
				Total	1.00	.	1
			Total	1	1.00	.	1
				Total	1.00	.	1
		Total	1	2	2.00	.	1
				Total	2.00	.	1
			2	1	1.00	.000	2
				2	2.00	.	1
				Total	1.33	.577	3
			3	1	1.00	.	1
				Total	1.00	.	1
			Total	1	1.00	.000	3
				2	2.00	.000	2
				Total	1.40	.548	5
	1	1	1	1	1.00	.000	3
				Total	1.00	.000	3
			2	1	1.00	.	1
				2	2.00	.	1

			Total	1.50	.707	2
		3	1	1.00	.	1
			Total	1.00	.	1
		Total	1	1.00	.000	5
			2	2.00	.	1
			Total	1.17	.408	6
	2	1	1	1.00	.	1
			Total	1.00	.	1
		2	1	1.00	.000	3
			Total	1.00	.000	3
		Total	1	1.00	.000	4
			Total	1.00	.000	4
	3	1	2	2.00	.000	3
			Total	2.00	.000	3
		2	1	1.25	.500	4
			2	1.00	.000	3
			Total	1.14	.378	7
		Total	1	1.25	.500	4
			2	1.50	.548	6
			Total	1.40	.516	10
	Total	1	1	1.00	.000	4
			2	2.00	.000	3
			Total	1.43	.535	7
		2	1	1.13	.354	8
			2	1.25	.500	4
			Total	1.17	.389	12
		3	1	1.00	.	1
			Total	1.00	.	1
		Total	1	1.08	.277	13
			2	1.57	.535	7
			Total	1.25	.444	20
2	1	1	1	2.00	.	1
			2	1.00	.	1
			Total	1.50	.707	2
		2	1	1.00	.	1
			Total	1.00	.	1
		Total	1	1.50	.707	2
			2	1.00	.	1
			Total	1.33	.577	3
	2	2	1	1.00	.	1
			Total	1.00	.	1
		Total	1	1.00	.	1
			Total	1.00	.	1
	3	1	1	2.00	1.414	2
			2	1.00	.	1
			Total	1.67	1.155	3
		2	1	1.00	.000	4

			2	1.50	.548	6
			Total	1.30	.483	10
		3	1	1.00	.000	2
			2	3.00	.	1
			Total	1.67	1.155	3
		Total	1	1.25	.707	8
			2	1.63	.744	8
			Total	1.44	.727	16
	Total	1	1	2.00	1.000	3
			2	1.00	.000	2
			Total	1.60	.894	5
		2	1	1.00	.000	6
			2	1.50	.548	6
			Total	1.25	.452	12
		3	1	1.00	.000	2
			2	3.00	.	1
			Total	1.67	1.155	3
		Total	1	1.27	.647	11
			2	1.56	.726	9
			Total	1.40	.681	20
Total	1	1	1	1.25	.500	4
			2	1.50	.707	2
			Total	1.33	.516	6
		2	1	1.00	.000	4
			2	2.00	.000	2
			Total	1.33	.516	6
		3	1	1.00	.	1
			Total	1.00	.	1
		Total	1	1.11	.333	9
			2	1.75	.500	4
			Total	1.31	.480	13
	2	1	1	1.00	.	1
			Total	1.00	.	1
		2	1	1.00	.000	4
			Total	1.00	.000	4
		Total	1	1.00	.000	5
			Total	1.00	.000	5
	3	1	1	2.00	1.414	2
			2	1.75	.500	4
			Total	1.83	.753	6
		2	1	1.13	.354	8
			2	1.33	.500	9
			Total	1.24	.437	17
		3	1	1.00	.000	3
			2	3.00	.	1
			Total	1.50	1.000	4
		Total	1	1.23	.599	13

				2	1.57	.646	14
				Total	1.41	.636	27
		Total	1	1	1.43	.787	7
				2	1.67	.516	6
				Total	1.54	.660	13
			2	1	1.06	.250	16
				2	1.45	.522	11
				Total	1.22	.424	27
			3	1	1.00	.000	4
				2	3.00	.	1
				Total	1.40	.894	5
			Total	1	1.15	.456	27
				2	1.61	.608	18
				Total	1.33	.564	45
2	0	1	1	1	2.00	.	1
				2	2.00	.000	2
				Total	2.00	.000	3
			2	1	1.00	.	1
				Total	1.00	.	1
			Total	1	1.50	.707	2
				2	2.00	.000	2
				Total	1.75	.500	4
		2	1	2	2.00	.	1
				Total	2.00	.	1
			2	1	1.33	.577	3
				2	2.00	.	1
				Total	1.50	.577	4
			Total	1	1.33	.577	3
				2	2.00	.000	2
				Total	1.60	.548	5
		Total	1	1	2.00	.	1
				2	2.00	.000	3
				Total	2.00	.000	4
			2	1	1.25	.500	4
				2	2.00	.	1
				Total	1.40	.548	5
			Total	1	1.40	.548	5
				2	2.00	.000	4
				Total	1.67	.500	9
	1	1	1	1	1.56	.527	9
				2	1.50	.707	2
				Total	1.55	.522	11
			2	1	1.00	.000	4
				2	1.67	.577	3

			Total	1.29	.488	7
		Total	1	1.38	.506	13
			2	1.60	.548	5
			Total	1.44	.511	18
	2	1	1	1.75	.500	4
			2	2.00	.000	3
			Total	1.86	.378	7
		2	1	1.30	.483	10
			2	1.00	.000	2
			Total	1.25	.452	12
		Total	1	1.43	.514	14
			2	1.60	.548	5
			Total	1.47	.513	19
	3	1	2	1.50	.707	2
			Total	1.50	.707	2
		2	1	1.60	.894	5
			2	1.50	.535	8
			Total	1.54	.660	13
		3	1	2.00	.	1
			Total	2.00	.	1
		Total	1	1.67	.816	6
			2	1.50	.527	10
			Total	1.56	.629	16
	Total	1	1	1.62	.506	13
			2	1.71	.488	7
			Total	1.65	.489	20
		2	1	1.32	.582	19
			2	1.46	.519	13
			Total	1.38	.554	32
		3	1	2.00	.	1
			Total	2.00	.	1
		Total	1	1.45	.564	33
			2	1.55	.510	20
			Total	1.49	.541	53
2	1	1	1	2.00	1.155	4
			Total	2.00	1.155	4
		2	1	1.00	.000	2
			Total	1.00	.000	2
		3	1	1.00	.	1
			Total	1.00	.	1
		Total	1	1.57	.976	7
			Total	1.57	.976	7
	2	1	1	1.00	.	1
			Total	1.00	.	1
		2	1	1.50	.707	2

			Total	1.50	.707	2
		Total	1	1.33	.577	3
			Total	1.33	.577	3
	3	1	1	1.00	.	1
			2	2.00	1.000	3
			Total	1.75	.957	4
		2	1	1.50	.837	6
			2	1.75	.957	4
			Total	1.60	.843	10
		3	1	1.00	.000	2
			Total	1.00	.000	2
		Total	1	1.33	.707	9
			2	1.86	.900	7
			Total	1.56	.814	16
	Total	1	1	1.67	1.033	6
			2	2.00	1.000	3
			Total	1.78	.972	9
		2	1	1.40	.699	10
			2	1.75	.957	4
			Total	1.50	.760	14
		3	1	1.00	.000	3
			Total	1.00	.000	3
		Total	1	1.42	.769	19
			2	1.86	.900	7
			Total	1.54	.811	26
Total	1	1	1	1.71	.726	14
			2	1.75	.500	4
			Total	1.72	.669	18
		2	1	1.00	.000	7
			2	1.67	.577	3
			Total	1.20	.422	10
		3	1	1.00	.	1
			Total	1.00	.	1
		Total	1	1.45	.671	22
			2	1.71	.488	7
			Total	1.52	.634	29
	2	1	1	1.60	.548	5
			2	2.00	.000	4
			Total	1.78	.441	9
		2	1	1.33	.488	15
			2	1.33	.577	3
			Total	1.33	.485	18
		Total	1	1.40	.503	20
			2	1.71	.488	7
			Total	1.48	.509	27
	3	1	1	1.00	.	1
			2	1.80	.837	5
			Total	1.67	.816	6

			2	1	1.55	.820	11
				2	1.58	.669	12
				Total	1.57	.728	23
			3	1	1.33	.577	3
				Total	1.33	.577	3
			Total	1	1.47	.743	15
				2	1.65	.702	17
				Total	1.56	.716	32
		Total	1	1	1.65	.671	20
				2	1.85	.555	13
				Total	1.73	.626	33
			2	1	1.33	.595	33
				2	1.56	.616	18
				Total	1.41	.606	51
			3	1	1.25	.500	4
				Total	1.25	.500	4
			Total	1	1.44	.627	57
				2	1.68	.599	31
				Total	1.52	.625	88
3	0	1	1	1	2.00	.000	2
				Total	2.00	.000	2
			Total	1	2.00	.000	2
				Total	2.00	.000	2
		Total	1	1	2.00	.000	2
				Total	2.00	.000	2
			Total	1	2.00	.000	2
				Total	2.00	.000	2
	1	1	1	1	1.40	.894	5
				2	1.67	.577	3
				Total	1.50	.756	8
			2	1	1.80	.447	5
				Total	1.80	.447	5
			Total	1	1.60	.699	10
				2	1.67	.577	3
				Total	1.62	.650	13
		2	1	2	2.00	.000	2
				Total	2.00	.000	2
			2	1	1.50	.577	4
				Total	1.50	.577	4
			3	1	2.00	.	1
				Total	2.00	.	1
			Total	1	1.60	.548	5
				2	2.00	.000	2
				Total	1.71	.488	7
		3	1	1	1.00	.	1
				2	1.00	.	1

			Total	1.00	.000	2
		2	1	1.00	.	1
			2	2.00	1.000	3
			Total	1.75	.957	4
		Total	1	1.00	.000	2
			2	1.75	.957	4
			Total	1.50	.837	6
	Total	1	1	1.33	.816	6
			2	1.67	.516	6
			Total	1.50	.674	12
		2	1	1.60	.516	10
			2	2.00	1.000	3
			Total	1.69	.630	13
		3	1	2.00	.	1
			Total	2.00	.	1
		Total	1	1.53	.624	17
			2	1.78	.667	9
			Total	1.62	.637	26
2	1	1	1	1.33	.577	3
			2	1.00	.	1
			Total	1.25	.500	4
		2	1	1.33	.577	3
			Total	1.33	.577	3
		3	1	1.00	.	1
			Total	1.00	.	1
		Total	1	1.29	.488	7
			2	1.00	.	1
			Total	1.25	.463	8
	2	1	1	1.00	.	1
			Total	1.00	.	1
		Total	1	1.00	.	1
			Total	1.00	.	1
	3	2	2	1.25	.500	4
			Total	1.25	.500	4
		3	2	2.00	1.414	2
			Total	2.00	1.414	2
		Total	2	1.50	.837	6
			Total	1.50	.837	6
	Total	1	1	1.25	.500	4
			2	1.00	.	1
			Total	1.20	.447	5
		2	1	1.33	.577	3
			2	1.25	.500	4
			Total	1.29	.488	7
		3	1	1.00	.	1

			2	2.00	1.414	2
			Total	1.67	1.155	3
		Total	1	1.25	.463	8
			2	1.43	.787	7
			Total	1.33	.617	15
Total	1	1	1	1.50	.707	10
			2	1.50	.577	4
			Total	1.50	.650	14
		2	1	1.63	.518	8
			Total	1.63	.518	8
		3	1	1.00	.	1
			Total	1.00	.	1
		Total	1	1.53	.612	19
			2	1.50	.577	4
			Total	1.52	.593	23
	2	1	1	1.00	.	1
			2	2.00	.000	2
			Total	1.67	.577	3
		2	1	1.50	.577	4
			Total	1.50	.577	4
		3	1	2.00	.	1
			Total	2.00	.	1
		Total	1	1.50	.548	6
			2	2.00	.000	2
			Total	1.63	.518	8
	3	1	1	1.00	.	1
			2	1.00	.	1
			Total	1.00	.000	2
		2	1	1.00	.	1
			2	1.57	.787	7
			Total	1.50	.756	8
		3	2	2.00	1.414	2
			Total	2.00	1.414	2
		Total	1	1.00	.000	2
			2	1.60	.843	10
			Total	1.50	.798	12
	Total	1	1	1.42	.669	12
			2	1.57	.535	7
			Total	1.47	.612	19
		2	1	1.54	.519	13
			2	1.57	.787	7
			Total	1.55	.605	20
		3	1	1.50	.707	2
			2	2.00	1.414	2
			Total	1.75	.957	4
		Total	1	1.48	.580	27

				2	1.63	.719	16
				Total	1.53	.631	43
Total	0	1	1	1	2.00	.000	3
				2	2.00	.000	3
				Total	2.00	.000	6
			2	1	1.00	.000	3
				2	2.00	.	1
				Total	1.25	.500	4
			Total	1	1.50	.548	6
				2	2.00	.000	4
				Total	1.70	.483	10
		2	1	2	2.00	.	1
				Total	2.00	.	1
			2	1	1.33	.577	3
				2	2.00	.	1
				Total	1.50	.577	4
			Total	1	1.33	.577	3
				2	2.00	.000	2
				Total	1.60	.548	5
		3	3	1	1.00	.	1
				Total	1.00	.	1
			Total	1	1.00	.	1
				Total	1.00	.	1
		Total	1	1	2.00	.000	3
				2	2.00	.000	4
				Total	2.00	.000	7
			2	1	1.17	.408	6
				2	2.00	.000	2
				Total	1.38	.518	8
			3	1	1.00	.	1
				Total	1.00	.	1
			Total	1	1.40	.516	10
				2	2.00	.000	6
				Total	1.63	.500	16
	1	1	1	1	1.41	.618	17
				2	1.60	.548	5
				Total	1.45	.596	22
			2	1	1.40	.516	10
				2	1.75	.500	4
				Total	1.50	.519	14
			3	1	1.00	.	1
				Total	1.00	.	1
			Total	1	1.39	.567	28
				2	1.67	.500	9
				Total	1.46	.558	37
		2	1	1	1.60	.548	5
				2	2.00	.000	5
				Total	1.80	.422	10
			2	1	1.29	.470	17
				2	1.00	.000	2
				Total	1.26	.452	19
			3	1	2.00	.	1

			Total	2.00	.	1
		Total	1	1.39	.499	23
			2	1.71	.488	7
			Total	1.47	.507	30
	3	1	1	1.00	.	1
			2	1.67	.516	6
			Total	1.57	.535	7
		2	1	1.40	.699	10
			2	1.50	.650	14
			Total	1.46	.658	24
		3	1	2.00	.	1
			Total	2.00	.	1
		Total	1	1.42	.669	12
			2	1.55	.605	20
			Total	1.50	.622	32
	Total	1	1	1.43	.590	23
			2	1.75	.447	16
			Total	1.56	.552	39
		2	1	1.35	.538	37
			2	1.50	.607	20
			Total	1.40	.563	57
		3	1	1.67	.577	3
			Total	1.67	.577	3
		Total	1	1.40	.555	63
			2	1.61	.549	36
			Total	1.47	.560	99
2	1	1	1	1.75	.886	8
			2	1.00	.000	2
			Total	1.60	.843	10
		2	1	1.17	.408	6
			Total	1.17	.408	6
		3	1	1.00	.000	2
			Total	1.00	.000	2
		Total	1	1.44	.727	16
			2	1.00	.000	2
			Total	1.39	.698	18
	2	1	1	1.00	.000	2
			Total	1.00	.000	2
		2	1	1.33	.577	3
			Total	1.33	.577	3
		Total	1	1.20	.447	5
			Total	1.20	.447	5
	3	1	1	1.67	1.155	3
			2	1.75	.957	4
			Total	1.71	.951	7

		2	1	1.30	.675	10
			2	1.50	.650	14
			Total	1.42	.654	24
		3	1	1.00	.000	4
			2	2.33	1.155	3
			Total	1.57	.976	7
		Total	1	1.29	.686	17
			2	1.67	.796	21
			Total	1.50	.762	38
	Total	1	1	1.62	.870	13
			2	1.50	.837	6
			Total	1.58	.838	19
		2	1	1.26	.562	19
			2	1.50	.650	14
			Total	1.36	.603	33
		3	1	1.00	.000	6
			2	2.33	1.155	3
			Total	1.44	.882	9
		Total	1	1.34	.669	38
			2	1.61	.783	23
			Total	1.44	.719	61
Total	1	1	1	1.57	.690	28
			2	1.60	.516	10
			Total	1.58	.642	38
		2	1	1.26	.452	19
			2	1.80	.447	5
			Total	1.38	.495	24
		3	1	1.00	.000	3
			Total	1.00	.000	3
		Total	1	1.42	.609	50
			2	1.67	.488	15
			Total	1.48	.589	65
	2	1	1	1.43	.535	7
			2	2.00	.000	6
			Total	1.69	.480	13
		2	1	1.30	.470	23
			2	1.33	.577	3
			Total	1.31	.471	26
		3	1	2.00	.	1
			Total	2.00	.	1
		Total	1	1.35	.486	31
			2	1.78	.441	9
			Total	1.45	.504	40
	3	1	1	1.50	1.000	4
			2	1.70	.675	10
			Total	1.64	.745	14
		2	1	1.35	.671	20

		2	1.50	.638	28
		Total	1.44	.649	48
	3	1	1.17	.408	6
		2	2.33	1.155	3
		Total	1.56	.882	9
	Total	1	1.33	.661	30
		2	1.61	.703	41
		Total	1.49	.694	71
Total	1	1	1.54	.682	39
		2	1.73	.533	26
		Total	1.62	.630	65
	2	1	1.31	.531	62
		2	1.53	.609	36
		Total	1.39	.568	98
	3	1	1.20	.422	10
		2	2.33	1.155	3
		Total	1.46	.776	13
	Total	1	1.38	.589	111
		2	1.65	.623	65
		Total	1.48	.614	176

Table 87. Descriptive Statistics - Self-confidence helps?

(ConfP)

REFERENCES

Actis, B. (1995). A Small School Ventures into the World of the CWIS. *Campus Wide Information Systems*, *12* (2), 20-26.

Ajzen, I. & Fishbein, M. (1977). *Understanding Attitudes and Predicting Social Behavior.* New York: Springer-Verlag.

Ajzen, I. (1985). *From Intentions to Actions, A Theory of Planned Behavior.* Berlin: Springer-Verlag.

Allen, T. (1977). *Managing the Flow of Technology: Technology Transfer and the Dissemination of Technology Information Within the R&D Organization.* Cambridge, MA: MIT Press.

Andersen, F. & Sturris, J. (1988). Chaotic Structures in Generic Management Models. *System Dynamics Review*, *4* (1-2), 218-245.

Anderson, P. (1999). Complexity Theory and Organization Science. *Organization Science*, *10* (3), 216-232.

Ashby, W. (1973). Some Peculiarities of Complex Systems. *Cybernetics Medicine*, *9* (2), 1-7.

Ashmos, D. & Huber, G. (1987). The Systems Paradigm in Organization Theory: Correcting the Record and Suggesting the Future. *Academy of Management Review, 12,* 607-621.

Ashmos, D., Duchson, D. & McDaniel, R. (2000). Organizational Responses to Complexity: The Effect on Organizational Performance. *Journal Change Management*, *13* (6), 577-594.

Ashmos, D., Huonker, J. & McDaniel, R. (1998). Participation as a Complicating Mechanism: The Effect of Clinical Professional and Middle Manager Participation on Hospital Performance. *Health Care Manage Review, 23* (4), 7-21.

Backlund, A. (2002). The Concept of Complexity in Organizations and Information Technologies. *Kybernets*, *31* (1), 30-43.

Bak, P. (1996). *How Nature Works: The Science of Self-Organizing Criticality.* (Springer-Verlag, Ed.) New York: Oxford University Press.

Bechtold, B. (1997). Chaos Theory as a Model for Strategy Development. *Empowerment in Organizations*, *5* (4), 193-201.

Bergmann, B. (2000). Emergence as a Process of Self-Organizing, New Assumptions and Insights from the Study on Non-Linear Dynamic Systems. *Journal of Organizational Change Management*, *13* (6), 526-544.

Broadbent, M., Weill, P. & St. Clair, D. (1999). The Implications of Information Technology Infrastructure for Business Process Redesign. *MIS Quarterly*, *23* (2), 159-182.

Caldart, A. & Ricart, J. (2004). Corporate Strategy Revisited: A View from Complexity Theory. *European Management Review*, *1*, 96-104.

Capra, F. (2002). *The Hidden Connections: A Science for Sustainable Living.* London: Harper Collins.

Cartwright, T. (1991). Planning and Chaos Theory. *American Planning Association Journal*, *57*, 44-56.

Chalquist, C. (2003). *A Paradigm Shift from Lines to Circles: Twelve Characteristics of a Family System.* Retrieved December 2, 2007, from Serendip: http://serendip.brynmawr.edu/complexity/Chalquist2.html

Changiz, T., Moeeny, A. & Jowsan, R. (2004). OFIS: Online Faculty Information System. *Campus-Wide Information Systems*, *21* (2), 95-100.

Chen, W. (1999). Business Process Management: a Thermodynamics Perspective. *Journal of Applied Management Studies*, *8* (2), 241-257.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd Edition). Hillsdale, NJ: Lawrence Erlbaum Assiciates.

Connolly, F. (1999). The Human Side of Campus Computing. *Campus-Wide Information Systems*, *16* (4), 131-135.

Dalhammar, C. (2002). Case Study: Design and Methods. *Methodology Course* (pg 1-5). IEEE.

Davis, L. (1992). Instrument Review: Getting the Most of Your Panel of Experts. *Applied Nursing Research*, *5*, 194-197.

Dent, E. (1999). Complexity Science: a Worldview Shift. *Emergence*, *1* (4), 5-19.

Dhillon, G. & Ward, J. (2002). Chaos Theory as a Framework for Studying Information Technologies. *Information Resources Management Journal, 15* (2), 5-13.

Dooley, K. (2002). Organizational Complexity. M. Warner (Ed.), *International Encyclopedia of Business and Management* (pg 5013-5022). London: Thompson Learning.

Driebe, D. (1999). The Wisdom of Uncertainty. (Humanidades, Ed.) *Conceptos*.

Drucker, P. (1989). *The New Realities.* New York, NY: Harper and Row Publishers.

Edgar, D. (1996). A Matter of Chaos – Some Issues for Hospitality Business. *International Journal of Contemporary Hospitality Management, 8* (2), 6-9.

Eijnatten, F., & van Galen, M. (2002). Chaos, Dialogue and the Dolphin's Strategy. *Journal of Organizational Change Management, 15* (4), 391-401.

Eisenhardt, K. (1989). Building Theories from Case Study Research. *Academy of Management Review, 14* (4), 532-550.

Fitzgerald, L., & Eijnatten, F. (2002). Chaos Speak: A Glossary of Chaordic Terms and Phrases. *Journal of Organizational Change Management, 15* (4), 412-423.

Fitzgerald, L., & Eijnatten, F. (2002). Reflections: Chaos in Organizational Change. *Journal of Organizational Change Management*, *15* (4), 402-411.

Ford, A. (1994). *Spinning the Web: How to Provide Information on the Internet* (1st Edition). New York: John Wiley & Sons, Inc.

Frederick, W. (1998). Creatures, Corporations, Communities, Chaos, Complexity. *Business and Society*, *37* (4), 358-389.

Freedman, D., Pisani, R. & Purves, R. (1997). *Statistics* (3rd Edition). W. W. Norton & Company.

Fulk, J., Schmitz, J. & Steinfield, C. (1990). *A Social Influence Model of Technology Use.* Newbury Park, CA: Sage.

Gathers, R. & Sutherland, A. (1991). Information Systems Management and Strategy Formulation: 'The Stages og Growth' Model Revisited. *Journal of Information Systems*, *1*, 89-114.

Gleick, J. (1988). *Chaos: Making a New Science.* New York: Penguin Books.

Grant, J. & Davis, L. (1997). Selection and Use of Content Experts for Instrument Dvelopment. *Research in Nursing and Health*, *20*, 269-274.

Guastello, S. (1995). *Chaos, Catastrophe, and Human Affairs: Applications of Non-Linear Dynamics to Work, Organizations, and Social Evolution.* Mah-wah, NJ: Lawrence Erlbaum Associates.

Hamel, J., Orum, A., & Sjoberg, G. (1991). *A Case for Case Study.* Chapel Hill, NC: University of North Carolina Press.

Hedberg, B. & Jonson, S. (1978). Designing Semi-confusing Information Technologies for Organizations in Changing Environments. *Accounting. Organizations and Society*, *3* (1), 47-64.

Helfer, J. (1998). Order Out of Chaos: A Practitioner's Guide to Knowledge Management. *Searcher, 6* (7), 44-51.

Hitt, L., & Snir, E. (1999). *The Role of Information Technology in Modern Production: Complement or Substitute to Other Inputs?* Retrieved on May 20, 2004, from Wharton: http://grace.wharton.upenn.edu/~lhitt/itsub.pdf

Johnson, L. & Burton, K. (1994). Chaos and Complexity Theory for Management: Caveat emptor. *Journal of Management Inquiry*, *3* (4), 320-328.

Jonston, R. & Vitale, R. (1988). Creating Competitive Advantage with Interorganizational Systems. *MIS Quarterly*, *12* (2), 153-165.

Jost, J. (1998). On the Notion of Complexity. *Theory in Biosciences, 117* (2), 161-171.

Kamps, J. & Pólos L. (1999). Reducing Uncertainty: A Formal Theory of Organizations in Action. *American Journal of Sociology,* 104.

Kauffman, S. & Macready, W. (1995). Technological Evolution and Adaptive Organizations. *Complexity, 1* (2), 26-43.

Kauffman, S. (1995). *At Home in the Universe.* New York, NY: Oxford University Press.

Keene, A. (2000). Complexity Theory: The Changing Role of Leadership. *Industrial and Commercial Training*, *32* (1), 15-18.

King, R., Grover, V. & Hufnagel, E. (1989). Using Information and Information Technology for Sustainable Competitive Advantage: Some Empirical Evidence. *Information and Management*, *17*, 87-93.

Klein, B., Goodhue, D. & Davis, G. (1997). Can Humans Detect Errors in Data? Impact of Base Rates, Incentives, and Goals. *MIS Quarterly*, 169-194.

Klobas, J. & Clyde, L. (1998). Learning to Use the Internet in a Developing Country: Validation of a User Model. *Libri*, *8* (3), 163-175.

Lagenfors, B. (1995). *Essays on Infology*. Lund: Studentlitteratur.

Laudon, K. & Laudon, J. (2004). *Management Information Systems* (8th Edition). Upper Saddle River, NJ: Pearson-Prentice Hall.

Levy, D. (1994). Chaos Theory and Strategy: Theory, Application, and Managerial Implications. *Strategic Management Journal*, *15*, 167-178.

Liang, T. (2002). The Inherent Structure and Dynamic of Intelligent Human Organizations. *Human Systems Management*, *21*, 9-19.

Lucas, H. (1978). Empirical Evidence for a Descriptive Model of Implementation. *MIS Quarterly*, *2*, 27-41.

Luhmann, N. (1995). *Social Systems*. Stanford University Press.

Lynn, M. (1986). Determination and Quantification of Content Validity. *Nursing Research*, *35*, 382-385.

Mainzer, K. (1997). *Thinking in Complexity: The Complex Dynamics of Matter, Mind, and Mankind* (3rd Edition). New York: Springer.

Markus, M. (1990). *Toward a 'Critical Mass' Theory of Interactive Media.* Newbury Park, CA: Sage.

Martin, W., Brown, V., DeHayes, W. Hoffer, J. & Perkins, C. (1999). *Managing Information Technology: What Managers Need to Know.* Upper Saddle River, NJ: Prentice Hall.

Mason, R. (1986). Four Ethical Issues of the Information Age. *MIS Quarterly, 10* (1).

Mathews, M., White, M. & Long, R. (1999). Why Study the Complexity Sciences in the Social Sciences? *Human Relations*, *52* (4), 449-453.

May, R. (1976). Simple Mathematical models with very complicated dynamics. *Nature*, *261*, 459-467.

McDaniel, R. & Driebe, D. (2001). Complexity Science and Health Care Management. *Advances in Health Care Management, 200* (2), 11-36.

McDaniel, R., Jordan, M. & Fleeman, B. (2003). Surprise, Surprise, Surprise! A Complexity Science View of the Unexpected. *Health Care Management Review, 28* (3), 266-278.

McGarland, D., Berg-Weger, M., Tebb, S., Lee, E. & Rauch, S. (2003). Objectifying Content Validity: Conducting a Content Validity Study in Social Work Research. *Social Work Research, 27* (2), 94-104.

Morel, B. & Ramanujan, R. (1999). Through the Looking Glass of Complexity: The Dynamics of Organizations as Adaptive and Evolving Systems. *Organization Science*, *10* (3), 278-293.

Murray, P. (1998). Complexity Theory and the Fifth Discipline. *Systemic Practice and Action Research*, *11* (3), 275-293.

Nakagawa, T. & Yasui, K. (1999). Note on Reliability of a System Complexity. *Proceedings of First Western Pacific and Third Australia-Japan Workshop on Stochastic Models in Engineering, Technology and Management*, (pg 377-386). Christchurch, New Zealand.

Nayar, M. (1993). Achieving Information Integrity. *Information Technologies Management*, *10* (2), 51-58.

Palmer, E. & Parker, D. (2001). Understanding Performance Measurement Systems Using Physical Science Uncertainty Principles. *International Journal of Operations & Production Management*, *21* (7), 981-999.

Pascale, R. (Spring de 1999). Surfing the Edge of Chaos. *Sloan Management Review*, 83-94.

Pigliucci, M. (2000). Chaos and Complexity: Should We Be Skeptical? *Skeptik*, *8* (3), 62-70.

Redman, T. (Winter de 1995). Improve Data Quality for Competitive Advantage. *Sloan Management Review*, 99-107.

Richards, D. (1990). Is Strategic Decision Making Chaotic? *Behavioral Science*, *35* (3), 219-232.

Ryssel, R., Ritter, T. & Gemünden, H. (2004). The Impact of Information Technology Deployment on Trust, Commitment and Value Creation in Business Relationships. *Journal of Business & Industrial Marketing, Information Technologies Management*, 51-58.

Santosus, M. (1998). *Business Management: Simple, yet Complex.* Retrieved on April 5, 2003, from CIO Enterprise Magazine: http://www.cio.com/archive/enterprise/041598_qanda_content.html

Scott, R. (1982). *Organizations: Rational, Natural and Open Systems* (2nd Edition). Englewoods Cliffs, NJ: Prentice hall.

Seel, R. (2003). *Complexity & Organization Development: An Introduction.* Retrieved on April 22, 2003, from New Paradigm: http://www.new-paradigm.co.uk/complex-od.htm

Stacey, R. (1996). *Strategic Management and Organizational Dynamics* (2nd Edition). Pitman.

Stacey, R. (1995). The Science of Complexity: An Alternative Perspective for Strategic Decision Process. *Strategic Management Journal*, *16*, 447-495.

Standish, R. (2001). On Complexity and Emergence. *Complexity International*, *9*, 1-6.

Sterman, J. (1994). Learning in and about Complex Systems. *Systems Dynamics Review*, *10* (2-3), 291-330.

Sterman, J. (2000). *System Dynamics Modeling: Tools for Learning in a Complex World.* Boston: Irwin/McGraw Hill.

Strauss, H. (1992). What is this Thing Called CWIS? *Academic and Library Computing*. Princeton.

Stump, L. & Sriram, V. (1997). Employing Information Technology in Purchasing: Buyer-Supplier Relationships and Size of the Supplier Base. *Industrial Marketing Management*, *26*, 127-136.

Styhre, A. (2002). Non-Linear Change in Organizations: Organization Change Management Informed by Complexity Theory. *Leadership & Organization Development Journal*, *23* (6/6), 343-351.

Sullivan, G. (1996). *Administrative Information Access.* (L. LLoyd, Ed.) Medford, NJ: Information Today.

Thietart, R. & Forgues, B. (1995). Chaos Theory and Organization. *Organization Science, 6* (1), 19-31.

Thompson, J. (1967). *Organizations in Action: Social Science Bases of Administrative Theory.* New York: McGraw Hill.

Torraco, R. (2002). Research Methods for Theory Building in Applied Disciplines: A Comparative Analysis. *Advances in Developing Human Resources*, *4* (3), 355-376.

Tsoukas, H. (1998). Chaos, Complexity and Organization Theory. *Organization, 5*, 291-313.

Vosburg, J., & Kumar, A. (2001). Managing Dirty Data in Organizations Using ERP: Lessons from a Case Study. *Industrial Management & Data Systems*, *101/1*, 21-31.

Waldrop, M. (1992). *Complexity: The Emerging Science at the Edge of the Order and Chaos.* New York: Touchstone by Simon and Schuster.

Walz, C., Strickland, O. & Lenz, E. (1991). *Management in Nursing Research* (2nd Edition). Philadelphia: F. A. Davis.

Weick, K. (1985). Cosmos vs. Chaos: Sense and Nonsense in Electronic Contexts. *Organization Dynamics, 14* (2), 51-64.