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CONTENTS

THE VALUE OF PRE-SCHOOL AND EDUCATION - HISTORICAL REVIEW AND CONTEMPORARY TRENDS IN PRE-SCHOOL EDUCATION

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ABSTRACT

Research data from the fields of Neurosciences and Psychology during the 20th century, suggests that cognitive, linguistic and socio-emotional development are largely shaped by the first six years of a child's life. At the same time, the experiences of children during infancy and early childhood influence their subsequent progression in school and their lives, justifying the great attention paid to pre-school education today, as well as the increasing worldwide interest in pre-school education; as well as its inclusion by government agencies in the legislative framework as compulsory. In this article an extensive bibliographical reference will be held by making a historical review, and the contemporary preschool education trends that dominate the field of education will emerge.

Keywords: *Value of Pre-school Education; Historical Review; Contemporary Trends.*

1. INTRODUCTION

When children go to kindergarten, they make a very important step towards learning and living, making the transition from the home to a more organized school environment; a transition which will greatly influence their stance towards school. A child in kindergarten receives "αγωγή" (i.e. education), a word derived by the word "άγω", which means to lead somebody towards a specific direction or objective; the child is being led to their somatic-spiritual and intellectual maturity through a harmonious coexistence with the environment.

As Ksohellis distinctively says: *"The pedagogical science is a social science which examines the human, which is to say, the changes in behaviour, especially during childhood and adolescence, in light of the effects of the education and learning process"* (Ksohellis, 1989) while he claims that by the term "education" *"the effects of adults and the general socio-cultural environment on the child are characterized."* (Ksohellis, 1989). A young child represents the future, a future full of hope, prospect

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and potential which will develop over time. Education is the means of converting our abilities into skills and that must start in children's early ages (Robinson, 2011).

Pre-school education is the first attempt, by society, to systematize the points of reference in terms of a child's development and to satisfy the three main rights of all children, which are summarized in moral and physical health, as well as freedom, by cultivating and developing the capability of a child for self-expression. According to Woodhead (1981), pre-school education is: *"a form of comprehensive education which envelops every aspect of the personal development of the child; motor, emotional, mental, social and moral development"* (p.17). Kindergarten is a space within which the children are acquainted with a variety of languages, cultures, as well as skills; since each child has their own pace of development, is in a different stage of development, possibly speaks a different language and lives in a different home environment. All the above differences comprise opportunities through which one child learns from the other, and together they become the members of a small society.

Pre-school age is a term which has been established for the first childhood ages – since birth until the age of five or six - and pre-school education refers to the education of a young child during that period of time. In Greece, organized pre-school education dates back to 1897, when Ekaterini Laskaridou (1842-1916), born in Vienna and daughter of Macedonian Konstantinos Christomanou, founded the college and first Nursery School in Athens, named "Model Kindergarten". The main characteristics of the first Nursery School's educational schedule philosophy was emphasis on the personality of the child, the peculiarities of childhood, the needs, interests, inclinations, interest in proper education and learning with the child in the epicenter, as well as emphasis on the importance of the general socio-cultural and natural environment. The main objective was the self-learning and self-education of the young person, and their emancipation, not their manipulation.

Later, in 1929, the institution of the Nursery School was officially recognized by the State (founding law 4397/1929), while now, according to article 73 of Law 3518/2006, it is a compulsory level of the Greek educational system. In this context, kindergarten is the educational institution which provides education to infants, aiming, according to legislation:

"to help children develop physically, emotionally, intellectually and socially, within the framework of the general objectives of primary and secondary education. Nursery School as an organization of socialization for the child (after the family), should ensure the conditions children need in order to develop and socialize smoothly and variedly. In this context, it is necessary to evenly integrate Pre-school Education into the uniform design of education, seeing Pre-school Education an integral part of the educational system of any advanced society and generalized principle" (Cross-thematic Curriculum Framework for Compulsory Education for Nursery School, 2003, p.586).

2. HISTORICAL REVIEW OF EDUCATION: PRIMARY SCHOOL EDUCATION

This phenomenon of child learning and education has its roots in ancient times, when Homer mentioned that the wise teachers of Achilles, Phoenix and Cheiron, were house-teachers (i.e. tutors), as they were called; individuals responsible for nurturing Achilles by providing him with useful knowledge in order for him to be able to fulfill his military and political duties (Marrou, 1961). The purpose of education is briefly defined with the phrase: «αἰέν ἀριστεύειν και ὑπείροχον ἔμμεναι ἄλλων»

Plato acknowledged the value of education and that is clearly seen in the Platonic dialogues. He himself stated the educational goods with which man can acquire true education and culture, as he diligently and passionately attended to matters of education. In his books, "The Republic" and "Laws", he mentioned the proper ways for educating young children, placing great importance on dancing, playing, movement and storytelling, as means of education for young children; he specifically says that the harmonious development of the body is sought through gymnastics and nurturing the soul is sought through music (Plato, The Republic, II, 376 E.). The definition of the concept of education he provides is: *«παιδείαν δή λέγω, την παραγιγνομένην δή πρῶτον παισίν ἀρετήν»* (Plato, Prot. 343a).

Aristotle also contributed decisively to the development of perceptions concerning education, and his views on virtue and the abilities of the soul were crucial driving forces for the theory and practice of education. With his speeches he decreed that the education of a child, as a citizen, is one of the main objectives of education and he illustrated the idealistic dimension of Greek education. "τό δέ ζητεῖν πανταχοῦ τό χρήσιμον ἥκιστα ἁρμόττει τοῖς μεγαλοψύχοις καί τοῖς ἐλευθέροις" (Aristotle, The Republic, T,3,1338b). He also argued that, with the educational ideals – the utilitarian, the intellectual, the moral and the aesthetic - a person becomes capable of living as a member of society a "κατ' ἀρετήν" (i.e. virtuous) prosperous life.

During the Roman era, Cicero (106-43 B.C.) placed special importance on adequately educating and teaching the new generation, claiming that, with education, virtuous roots evolve and wickedness is cleared (Iliopoulou K., The policy of Rome to Latin writers and their national conscience, Athens, 1974). Consequently, Cointilianus argued that education should begin very early, because the skills humans have when they are born should be developed from a young age, while Plutarch (45/50-120/125 A.D.) argued that the purpose of education is the preparation of children for justice and for a virtuous life; as the members of the bodies of children need to be refracted immediately after birth in order to function properly, their morals should be shaped from the beginning in the same manner (Kosma, 1975).

During the Christian era, Christian education and pedagogy were inspired by the teachings of Christ, the Apostles and the Fathers of the Church, and the creation of a new education ideal, which was guided by intra-cosmic anthropocentrism and

advising the parents, concerning the proper education of their children, was an indisputable reality (Kapsomenou, 1953).

During the Renaissance, humanitarians François Rabelais (1494-1553) and Michel de Montaigne (1533-1592) expressed ideas which prepared the ground for modern pedagogy, whose objective was for man to become a free and independent personality, one that creates and acts freely during their life (Isigonis, 1964). Humanitarians demonstrated complete understanding of the individuality of each student and emphasized on the manner of teaching in a form of playing, and respecting the distinctiveness of the soul of the child; it was absolutely necessary to develop the student's judgement through observation and experimentation within the environment.

In the 17th century, Comenius (1692-1670), as a herald of scientific pedagogy in Western Europe, and through his work Didactica Magna, says that man, during his life, is under the influence of a school which consists of four levels. During the first six years of their life, a child is an apprentice at the school of family, or, as Comenius calls it - emphasizing the role of mothers in education - the "maternal school". At this school, a child acquires basic experiences from all fields of life and culture, and sets foundations for their psychosomatic evolution. Elementary school, lasting from the 6th to 12th year of age, high school which lasts six years and finally, University, follows their example. Comenius is considered the leading representative of realism and his views significantly contributed to the development of modern pedagogy, while in his book "Schola infantiae sive de provida juventutis primo sex ennio educatione" advice is given to mothers, concerning the upbringing of young children, as well as suggested ways to help with the motor and mental development of the children (Kosma, 1975).

The ideas of French philosopher Jean Jacques Rousseau (1712-1778) were important as well. Through his work Emile (1972), he demonstrated the value of initiative the child must develop, emphasizing that *"it must be the center of education and scientific education"* (Rousseau, 1957, in Kosma, 1975); in this manner, he encouraged pedagogues to explore the development of children. He stressed the distinctiveness of childhood, something which was not acknowledged until then, and he said: *"Nature wants children to be children before they mature. If we wish to change this order, we will have early fruit, which will have neither flavor, nor maturity"* (Rousseau, 1957, in Kosma, 1975). Through his work, he declares absolute faith in the power of man and the beneficial influence nature and free contact with it has on him.

"Allow children to develop on their own, like plants; to self-evolve and self-educate, away from parents, schools, society. Bring them back to nature and release them there, let them read on their own from the open book of nature".

Johann Heinrich Pestalozzi followed, founding the first center of pre-school education and applying Rousseau's ideas by implementing them on the first pre-school education center; he was the main creator of the modern methods of

supervisory teaching and a supporter of the development of genuine pedagogical relationship between the pupil and the teacher (Flitner, 1983).

"Man is good by nature and wants to remain good, but he also wants to be happy. If a man is evil, you can be sure that somebody put obstacles on the path to happiness he chose. That which educates us is life. Everything the child attempts, their emotional, mental and professional education must be closely related to actual life" (Papanek, 1975).

A student of Pestalozzi, Friederich Fröbel, founded the first kindergarten in Germany in 1840; it became a landmark in the history of pre-school education and was initially called Kleinkindebe-schaftigungastalt and later Kindergarten. Fröbel was the pioneer of scientific foundation of their operation (Laskaridou, 1882).

From the mid-18th century forward, the movement of neo-humanism is revived. Neo-humanism places greater importance on classic ancient Greek tradition and the study of the ancient Greek language and literature, with the main purpose and objective to complete the personality of man, as well as the harmonious development of all its aspects (Georgoulis, 1963). In order to achieve this objective, studying classical literature and learning classical languages – and especially the Greek language - was necessary.

The main representative of this movement was Wilhelm Von Humboldt, who placed special emphasis on the agency of the students and their engagement in a variety of activities, such as music, foreign languages, gymnastics, etc. (Flitner, 1983). He supported essential education by cultivating the personality, both in terms of individuality, as well as in terms of universality and wholeness (Kassotakis, 2006). This particular movement gave prominence to classical literature, and especially the ancient Greek Language and Literature, stressing their educational value.

Subsequently, the New Education movement abandoned the authoritarian methods of the past and cultivated a climate of freedom, which brought the school closer to the real life, by assimilating a fresh view on the educational data of the time. With Claparède, who was a connoisseur of child psychology and childhood on which he paid special attention, as its main representative, New Education claimed that teaching must abide by the potential and the rhythm of development of the child (Dottrens, 1974). Claparède, in fact, promoted the value and importance of music on the general education of children, and associated it with the science of psychology. He observed that:

"education in rhythmic motion helped the children in other lessons, by developing their skills in observation and analysis cognizance, understanding and memorizing. The children responded better through music, they were more adaptable and more vibrant in terms of personality" (Sergi, 1994).

The purpose and prospects of kindergarten during the second period of 1890 are revised and new content is introduced to the concept and function of kindergarten. Maria Montessori, with her book *"The method of Scientific Pedagogy"*, along with

ideas which emerged from the Rousseau School, attaches immense importance to early childhood development based on the nature and needs of the child itself, and with the belief that children can become the hope for a dynamic social change, while the school can become a means of progress and social reform, instead of an ancient institution (Koutsouvanou, 1994).

Her main idea was that a "prepared environment" could motivate the spontaneous interest of children in exploration and discovery, so that they could conquer knowledge on their own. To that end, Maria Montessori creates a learning environment, "the home of the child", which is necessary to fully utilize the abilities of the children and, simultaneously, enables the child to be responsible for shaping its life. Actualization of self-modulation and assuming responsibility through active confrontation of problems and difficulties, are the general objectives of education. The educational material provided is, thus, methodologically prepared, so that it is self-correcting and so that the incorrect solution can be automatically perceivable and corrected.

The movement of "New Education", with John Dewey as its main representative, focused on the interaction between school and life, the priority of social education, the development of cooperation and democratic spirit, and especially on the theory of Learning by Doing, where the teachers cannot remain attached to the stiff role of the wisdom-bearer, but they must assume the salient function of the mediator, in which the teacher poses questions and challenges. This method is oriented towards the Socratic dialogue which, Dewey, as a Plato connoisseur, believed would make knowledge acquisition possible if exercised properly, instead of only transferring knowledge (Dewey 1938). The theories of Dewey led to increasing interest in the way children learn, especially in their early childhood (Sergi, 1995).

Cognitive theories, according to which the development of a child depends on its energetic activity and active role in understanding the world in which they live, in which the main task of teachers is to nourish the course of this development, made significant impact. Those theories on the way cognitive functions develop since birth until adulthood, with Jean Piaget (1896-1980) and Jerome Bruner (1915-2016) with his "theory of teaching" as their main representatives, made a great impact both on the theoretical background as well as the didactic methodology and pre-school programs.

But which are the innovations that influenced the development of pre-school educational programs and which educational research has contributed in developing appropriate educational frameworks in pre-school education?

3. CONTEMPORARY TRENDS IN PRE-SCHOOL EDUCATION

The main principles of Pre-school Education are: the rounded, harmonious and balanced development of the mental and psychosomatic abilities of infants, the development of creative and critical thinking, the development of friendship and

cooperation, and their successful social integration. The new operation framework of the Kindergarten, along with the implementation of the Cross-curricular Integrated Frameworks of Study Programs (C.I.F.S.P.), is a Curriculum renewal attempt. Integrated programs involve and develop all aspects of a child (cognitive, emotional, physical and social) and utilize their experiences and interests. Implementation of their main principles aims at the creation of a modern and progressive school, which will meet new social and scientific needs.

In order to respond to needs which arise from a society of reclassifications and changes, such as large population movements due to the global crisis and the socio-historical context, the modern Kindergarten tries to elucidate the *"way in which the deeper learning process is constructed"* in children (Koutsouvanou, 2000), while, at the same time, constituting a *"protected and protective habitat"* (Kontakos and Polemikos, 2000) for all children from various socio-economic environments, with different cultures, different ways of life and backgrounds.

For children who start their educational course in kindergarten, adopting positive attitudes towards school and cultivating learning incentives is extremely important - even more than acquiring knowledge and skills, as stated by Katz (1993b). Therefore, it is necessary to develop a functional learning environment which will be rich in stimuli and will encourage children to explore and discover learning by solving real problems; a didactic model which allows the child to seek, comprehend and apply "useful knowledge". Children are involved in social issues, in their own way and according to their own needs, while relating their task to the real world; a fact which sensitizes and integrates them into the community in the best possible way (Nagel, 1996). Children can achieve knowledge building by developing curiosity and judgement within a context where learning activities will have meaning for them and will help them to better understand facts and phenomena of their environment (Doliopoulou, 1999/2004).

Researchers in the western world, pay attention to questions such as: how children learn, which are the best pedagogic approaches which can support their learning and social evolution and their rounded development. An innovation which began being implemented in kindergartens in Great Britain in the 1960s and 1970s, is the experiential approach to learning, also known as the Project Approach. This approach was a key part of British infant schools and the American "open education", while it resembles the modern developmental-interactional Bank Street approach which is analyzed below.

The Project Method is based on the belief that the interests of children must be the starting point for learning (Helm and Katz, 2002). The didactic model of active learning has advanced more than any other because, as is shown through various researches, it activates a personal style of learning, the preferences and inclinations of students - always compared to more passive didactic practices (Snowman et al., 2006).

Interest in the experiential approach, however, was revived after the publication of the book "Engaging Children's Minds: The Project Approach" (Katz and Chard, 1989). The Project Pedagogy began with the great pedagogue John Dewey and is specifically based on his introduction of a learning principle: "learning by doing". Principles such as knowledge acquisition through action and active participation of the children, and development of methodological skills, as well as pedagogical values such as responsibility, autonomy, respect and creativity are fundamental for the Project Pedagogy - which is based on the belief that the interests of the children are the starting point of learning. Hence, school becomes child-centered, in the sense that the didactic, as well as the pedagogical energy is based on the student, their strengths and their mental specificity (Pantazis; Sakellariou, 2005).

A matter, in which children are interested and is studied by them through different points of view in different ways, is a project plan which, as stated by Bellenger and Couchaere (2012), follows *"a course towards something that is being planned, is a movement and a dynamic accompanied by the concept of hatching, which can be actualized at any moment".* Through the project, and extensive and comprehensive research of an issue in which they are involved, children are given the chance to pose questions, generalize theories, predict and use their experiences in order to learn, developing their mental capacity and *"activating their minds for knowledge seeking, understanding and acquiring skills"* (Katz and Chard, 1989).

Creative exploitation of the Project Pedagogy found fertile breeding ground in the small town of Reggio Emilia in Northern Italy, where Diana was chosen by the American magazine Newsweek as one of the ten best schools worldwide. Time allocation and the great importance placed on the personal rhythm of children, the environment design with organized learning material, as well as classrooms to support cooperative learning along with the cooperation of the parents, so that, as referenced by Lorris Malaguzzi, children and adults could enjoy education and seek pleasure in playing, working and collaborating (Malaguzzi, 1993), are fundamental prerequisites for the successful completion of a project which, as stated, is what happens at Reggio Emilia. It is worth noting that the technique of the project can influence the attitude and performance of the learner, integrating a child in their social and cultural environment (situated learning environment) (Lave et al., 2003).

Another approach – which has been widely propagated especially in the United States during the mid-1980s, after a significant shift towards pre-school education program, is that of the "Developmentally Appropriate Practices" for pre-school education. The National Association for the Education of Young Children of the U.S.A, through its guide to pre-school and early childhood education (NAYEC, 1986), prioritized active experiential learning and developmentally appropriate practices, where emphasis is placed on the child and their development, and primary importance on the learning process, rather than its results in specific fields and knowledge.

Teachers and children interact actively, in order to approach knowledge from different angles, while the teacher, during the appropriate developmental programs, offers experiences and choices which must, however, have meaning as far the children are concerned, and be important for them, satisfying their needs and interests, and, finally, be adjusted according to the rhythm and skill of each child. Research on development and the learning capacity of children has shown that *"which activities, which material, which interactions and experiences are safe, healthy, interesting, accessible and, simultaneously, challenging for children"* should be considered (Bredekamp and Copple, 1997).

In the pedagogy of interaction, children are encouraged to collaborate and juxtapose ideas, while the main role of teachers is to empower them for those mental and social exchanges, and be aware of "how children learn" and "what do we do so that the children learn", offering and creating situations in which they are featured (CRESAS, 1992). After all, it is important to depend on what children already know and can do, encouraging them to acquire new knowledge and skills through playing and team work (Bredekamp and Copple, 1997; Chrysafidis, 2004).

Within the context of challenging the traditional organization approaches and knowledge teaching methods, the cross-thematic approach was developed among others; it is a multidisciplinary process of a matter, in a more natural and direct way, cooperative and multifaceted (Vitsilaki, 2005). As Chrysafidis says, cross-thematic means *"approaching knowledge through a sequence of processes of individual thematic modules, which happens with the contribution of individual scientific fields, i.e. interdisciplinary"* (2009, p.39). With the cross-thematic approach, a child can reach an understanding of the world and its phenomena through *"unifying, interesting and accessible routes"* (Germanos, 2005).

In the cross-thematic approach, as well as in the projects which have already been mentioned, the learning objectives of the programs are designed and developed according to the needs and interests of children, with the sole difference between them as to whether the subject is raised by the children or the teacher (Matsaggouras, 2002). A very significant distinction, however, between the project and cross-thematic approaches, lies on the degree of the children themselves deepening studying, because in the case of thematic approaches, emphasis is placed on the learning aspirations set by the teacher, whereas in the case of project learning, it is placed on the contribution of the children on designing and developing activities, as mentioned in the teacher and pre-school education guide (Dafermou, Koulouri, Mpasagianni, 2005).

In the cross-thematic approach, the teacher premeditates an activity with a specific duration, prepares the supporting material which will be used and appropriately arranges the space to support it (Helm and Katz, 2002), while the emphasis in the cross-thematic approach is placed on the deliberate recognition of propinquity between the different lessons.

As Sergi mentions (1995), *"the main objective of a cross-thematic program in kindergarten is to offer a balanced didactic program. Such a program incorporates the content and processes objectives from all thematic areas, while, at the same time, allows the nursery teacher to respond to the social, emotional, physical and intellectual needs of the children".*

The cross-thematic approach takes into consideration the difficulty of *child perception* to grasp knowledge when that is divided into separate scientific fields, but the very nature of *reality* as well, which, despite its complexity, demonstrates unimpaired unity (Theofilidis, 1997). A research conducted in kindergartens in Cyprus, showed the positive effects of the cross-thematic approach with music as a central axis in shaping the personalities of children (Sergi, 1995).

Furthermore, it must be pointed out that this spherical examination of phenomena and situations may offer a qualitatively upgraded image of the Environment, because, according to the Theory of Morphological Psychology (Fitzek and Salber, 1996), the whole means more than the elements of which it is composed, therefore, the interdisciplinary-cross-thematic approach adds a special dimension, superior to those that other individual scientific approaches offer. The cross-thematic approach allows and features connections between different cognitive areas, thus enhancing correlations, compositions and generalizations which lead to a holistic view of knowledge (Matsaggouras, 2002).

The main pursuit of the cross-thematic approach is the cultivation of self-emotion, where self-emotion is, *"the awareness, the consciousness that one is worthy, which is associated with the emotion of honour, the famed decency, which can become a source of creative elevation or total destruction, depending on how it is handled; especially during adolescence, when it is especially trenchant and sharp. Its variations include sportsmanship, ambition, vanity, self-respect, appreciation, acknowledgement of superiority, admiration or arrogance. Social feelings include persuasion, obedience or their opposites, cowardice and fear during conversation and interaction with others"* (Flouris, 2003).

Based on modern views on pre-school and pre-primary school education of children, the main principles – of which the importance has been supported by educational research of the last few decades - are followed within the Cross-thematic Curriculum Framework for Compulsory Education for Nursery School of our country (2003), and are thusly summarized:

- Recognition of the importance and distinctiveness of childhood and the ways in which the child thinks and learns.
- The perception proven by research on the active "building" of knowledge by children and knowledge they acquire through interaction with the natural and social environment.
- Recognition of the special value of playing as the most appropriate means of learning, child development, expression of emotion, development of symbolic

functions and comprehension of the surrounding world. Through games and playful ways, children express and support their interests, and find creative ways to solve problems (Swink and Buchanan, 1984).

- The belief that an environment rich in stimuli can better contribute to the multifaceted personal development of children of that age.
- The principle, according to expounded theories, of respecting the specific needs and the personal development rhythm of each child; and teachers respecting this principle.
- The special significance given to the role of the educator, who is responsible for shaping the appropriate environment, providing appropriate experiences in order to encourage the natural tendency of children to explore and experiment, and their presence as listeners and correspondents of the ideas, needs and interests of children. Children with limited opportunities to appropriate experiences during their early years may be delayed in brain development, a fact which can have negative consequences and impacts on their future learning (Isbell and Exelby, 2001).
- The importance of the comprehensive development of personality.
- The respect afforded to the principle that development and learning are affected by the culture of each country and the various social contexts, cultivating empathy and intercultural capacity of each individual. Moreover, pre-school children possess an awareness, as well as curiosity, of the differences and similarities between people; through questions and internalization of theories, their attitudes according to the mental stage of their development and their life experience, are shaped (Katz, 1982).
- The respect towards the fact that the compensatory role of pre-school education can mitigate the negative factors of the family and socio-cultural background of a child, which can negatively affect its subsequent development and its success in school. An increasing number of research reveals the short-term benefits of kindergarten for children from a low socio-economic background (Cross-thematic Curriculum Framework for Compulsory Education for Nursery School, 2003).

4. CONCLUSION

By integrating kindergarten into the uniform design of education, the important role it plays for the child as well as the society is recognized, the interests of the children are presented as a main incentive towards learning, and based on this, the educational curriculum is configured by promoting the cross-thematic approach, which allows and features the interconnections between different cognitive areas and accepts knowledge as a whole. Furthermore, kindergarten as an institution of socialization for children, apart from the family, should ensure all prerequisites, so

that the children can develop and socialize smoothly and fully, within the context of the broader objectives of primary education.

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EXAMINING THE FACTORS AFFECTING STUDENTS' PERCEPTIONS AND VOCATIONAL PROGRAM CHOICES: A CASE STUDY OF THE VOCATIONAL AND TECHNICAL SCHOOLS OF CYPRUS

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ABSTRACT

This paper examines students' perceptions and behaviours during the selection or rejection process of a vocational program. A cross-sectional survey research design was employed to investigate students' perceptions and two different questionnaires were used. Data were collected via face-to-face administered survey questionnaires from 298 students. The findings indicated a gap in the students' perceptions between VTS (also known as vocational education and training, VETS) and high school students. Individual decision-making attitudes, trustworthy individuals, and program selection quality criteria comprised the micro-environmental factors, leading to serious misconceptions about VET. Thus, society's acceptance level and the social esteem of VET in relation to the reshaping of public opinion and the media role about vocational professions complete the macro-environmental factors that influence program choices.

***Keywords**: Vocational Education; Students' Perception; Vocational Education; Hospitality and Catering Programs.*

1. INTRODUCTION

The economy of Cyprus depends on the hospitality industry since the late 1960s and hotel and catering programs (HCP) were developed in vocational and technical schools (VTS) in order to serve a two-fold purpose (Persianis, 1996). The first purpose was to contribute to the local communities by offering more job openings and career advancement as well as better living standards for locals. The second purpose was to sustain the growth and the employability of the national economy (Korelli and Mourouzides, 2016). Although, employability in the hospitality industry is very high compared to other industries even today, the reputation of HCP seems to have slowly faded away due to social and reputational misconceptions. Such reputational misconceptions concern public opinion, which holds the belief that in the Cypriot educational market, only academically weak students select HCP (Zopiatis and Kiprianou, 2006). As a result, the choice of HCP as a program of study is not based on employability or career potentials of the perspective students. HCP are downgraded to

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a choice of academically weak students who have no career aspirations, thus simultaneously affecting VTS and its programs' attractiveness in Cypriot society and the education market (Zopiatis and Kiprianou, 2006).

2. BACKGROUND

VTS, or more specifically the program's attractiveness, is defined in the Cedefop Report as the ability to stimulate interest and motivate potential students to deliberately choose a VTS program by offering high quality professional qualifications and competencies that widen one's career and professional horizons (Korelli and Mourouzides, 2016). The attractiveness of a VTS was found to be highly affected by the willingness and preference of employers to recruit VTS graduates holding vocational education and training certificates (VETC; Brunello and Rocco, 2015; Cedefop, 2014). The level which a VETC is connected to a better reward system (financial or non-financial) or how it eases the job finding process for a graduate, acts as a catalytic factor for a student in selecting a VTS program (Lim, 2015).

As a result, a VTS or its program's attractiveness may be improved drastically and grow stronger not only to support a more prestigious public image for VTS within society, but also in contributing towards the healthy economic development of a country or a region (Cedefop, 2014). VTP gained particular popularity and became an integrated part of the European educational policy for vocational education training (VET) as VET was related to the economy and employment growth rates within the European Union (EU; Paidousi, 2016). In the Bruges Communiqué Report (2010), for example, it forecasted that VET systems throughout EU member states will become more attractive by 2020 due to being career-oriented, accessible, innovative, and flexible. Cyprus as an EU member state adopted this target - although it is needed to examine and answer two important questions for achieving further progression of VET in Cyprus:

- What are the factors affecting students' perceptions about a VTP or VTS?
- What are the dynamics influencing students' program choices?

The available research and studies regarding the attractiveness of VET in Cyprus is very limited compared to other EU member states (Symeou et al., 2004). Unfortunately, VET in Cyprus has developed a bad reputation, a negative image, and is of a very low attractiveness among students' choices (Zopiatis and Kiprianou, 2006). The presence of weak students, dominate public opinion about the students who select VTP at a VTS. As a result, VTS take in the most academically and socially vulnerable groups of students characterized by students of low academic performance, coming from less privileged social groups (Education, 2015). This is happening at a moment wherein all private or public educational institutions of secondary level education strive to attract students of high academic performance, aptitude, and achievement. Therefore, the current study examined the factors that affect the

students' perceptions about VTP and VTS, and the dynamics influencing program choice in the VTS within secondary education in Cyprus. Consequently, the research objectives led to the formulation of two basic research questions:

- What are the factors affecting students' perceptions about VTP or VTS?
- What are the dynamics influencing students' decision-making processes in selecting a VTP or VTS?

3. LITERATURE REVIEW

A review of the existing literature indicated that students' study perceptions and study choices are highly affected by personal and social dynamics, which impact students' decision-making processes and attitudes. Personal and social dynamics were believed to be as the most important parameter in selecting or rejecting a VTP (Dimaki et al., 2004; Kambouri, 2012). At a personal level, trustworthy individuals such as parents and the students' peers as well as the general family environment play an important role of nourishing, positively or negatively, information-seeking behaviours that affect the decision-making process of individuals (Kracke, 2002). At a social level, the educational market in Cyprus is found to favour and progress academic programs due to the need for a better "social prestige" and social image (Kambouri, 2012). Kambouri (2012) also concluded that social prestige is a powerful social dynamic that may strongly affect or be affected by the students or parents' particular psychological and behavioural decision-making attitudes (see also Reed et al., 2004).

The term, decision-making attitudes, in the current study describes the various views and perceptions that people have developed about things, events, and conditions in selecting or rejecting alternative educational program choices (Ayub, 2015; Dalley-Trim et al., 2008). Such decision-making attitudes are significantly affected by the demographic characteristics of the perspective students. For example, Atkins and Flint (2015) acknowledged students' gender as a serious program selection indicator in VET as gender has a strong influence on the students' decision-making attitude. For instance, hairdressing is dominated by female students, whereas engineering is dominated by male students. Also, a family's social class or parents' prior learning of having had positive experiences as students in VTPs play an influential role in a student's program selection and decision-making attitude (Ayub, 2015; Lavendels et al., 2012).

Therefore, society's acceptance level and the social esteem of VET within a particular country, region, or local society underlines the generated influences from different social dynamics. VTS' "stigma" and the marginalization of VTP are serious negative dynamics rooted in the heart of VTS' unattractiveness (Atkins and Flint, 2015). Dalley-Trim et al. (2008) concluded that the status of VET within a particular social frame is aligned basically to the type of a student who is suited for and enrolled

in VTS and the nature of VTP subjects to be selected. VET is regarded as a "soft" learning option and therefore suitable for weak students, while academic programs have higher esteem in comparison to VET primarily due to their link between university entrance and career prospects (Atkins and Flint, 2015). Consequently, academic programs have received more attention and better educational marketing in the recent past within the Cypriot educational market.

3.1. Students as consumers

The concept of educational marketing was established in 1970 with the theory of marketization (Popovic, 2015). Students' perceptions and program choices are being identified as an issue related to consumer behaviour and the purchase decision-making process. Kotler and Keller (2012) crafted the purchasing decision-making process as a multi-step process within which individuals have to recognize a problem (VET over academic programs), search for information from multiple sources, and evaluate alternative choices in order to proceed with the final decision-making. In marketization theory, students are viewed as consumers (Naidoo, et al. 2011) who develop and use various quality criteria in selecting a particular educational program (Bobâlcă et al., 2014).

According to Chapman (1981), program selection quality criteria may refer to personal and subjective likes or dislikes, such as an easy-going choice, course characteristics and content, course reputation, level of aptitude, or personal career aspiration. Hence, quality criteria used by potential students in the decision-making process may be more objective, specific, and tangible in relation to measurable and result-oriented criteria, such as the program's links to career prospects and university entrance along with the required entry examinations and grades (Bobâlcă et al., 2014). Moogan and Baron (2003) explained that given the negative reputation and the unattractiveness of VTP among students' preferences, a comprehensive examination is needed in order to understand the influence and impact of the selection criteria on national or regional levels.

HCP, for example, are experiencing an important growth rate in Cypriot VTS (CHMA, 2016) due to the reshaping of public opinion and the media "brainwashing" taking place (The Guardian, 2014). The increased growth was the fruitful outcome of media's role as TV shows and cooking contests, along with the appearance of good-looking celebrity chefs with body tattoos promoted, intentionally or not, a new professional style and lifestyle for a cook (Johnston, Rodney and Chong, 2014). As a result, the publicity gained through TV shows, social media, and or the internet improved the image of many complementary services or products of the cooking profession, increasing simultaneously the attractiveness of HCP among the study choices of secondary education level school students.

In summation, the negative image and attitudes of the students and society towards VTP started to be countermoveed, influencing simultaneously students' decision-making attitudes. Such an adjustment in a person's view or perception about a particular topic or case (Ayub, 2015) was achieved by well-crafted communication through daily TV shows and cooking contests (The Guardian, 2014). These TV shows and cooking contests helped to build awareness and a differing public opinion about VTPs, enhancing the students' decision-making attitudes towards HCP (Barnes, 2017). The extensive social and media publicity acted as a reconstructing, reshaping, and reengineering process of the VTS product, HCP (The Guardian, 2014).

4. METHODOLOGY

The goal of this study was to examine the factors, which affect the number and quality of students attracted to HCP and VTS. In fulfilling this goal, the factors which affect students' perceptions about VTP or VTS and the dynamics influencing students' decision-making processes in selecting a VTP were examined. In doing so, a review of existing literature sources (secondary data) set a solid foundation for the deployment of the theoretical boundaries and basis in understanding the various dynamics affecting potential students' school or program choices. Therefore, in fulfilling the objectives of this study, a cross-sectional survey research design was employed. A survey research design enables the gathering of a large number of related data by using questionnaires (Creswell and Clark, 2007). Hence, the survey research strategy helped in gathering primary data from students being regarded as consumers. Eagle (2007) stated that researchers need to widen their research to investigate students' preferences, perceptions, and behaviours in relation to the selection process of educational institutions. Consequently, for the research needs of the current study, gymnasium graduate students were regarded as consumers and HCP as the product. In doing so, the design of the survey questionnaires was based on three pillars taking the form of three important questions:

- To what extent do decision strategies used by students in making their choice of school correlate with their level of satisfaction with the chosen type of school?
- To what extent do decision strategies correlate with their future behaviour with respect to their intention to recommend VTS or VTP or to switch to a different school type in the future?
- To what extent do school-based variables (e.g., quality, accessibility, program content) associate with the above mentioned three fundamental variables in the same order (i.e., satisfaction, recommendation, and switching)?

4.1. Sampling method

A stratified sampling method was used to collect data. Such a sampling method allows the gathering of information from relatively homogenous sub-groups that are non-overlapping, distinct, and share common characteristics (Hair et al., 2005). A representative sample of 298 students studying in a VTS or lyceum in the district of Ammochostos and Larnaca participated in the study. Each school was associated with student profile characteristics such as gender and discipline areas. The questionnaires were anonymous, so the students could answer honestly with no fear of disclosing their identity, while the purpose of the research was specified so they were informed as to how their responses would be used.

4.2. Measures

Two different questionnaires were developed and specifically crafted to collect data from students in a VTS or lyceum. Each questionnaire format was designed to allow the assembly of a set of data for each respondent against a consistent set of questions. The questions and or statements were related to the factors influencing the students' school or program choice, VTS or lyceum. Also, the students' views were examined on whether their expectations met their actual experience after their first year of studies.

A. The first questionnaire, utilized for VTS students, consists of 50 closed-ended questions and seven open-ended questions divided into six sections.

B. The second questionnaire, administered to lyceum students, consists of 42 closed-ended questions and seven open-ended questions divided into six sections.

All questions were developed according to the emerging themes from the literature review. Closed-ended questions were selected so the students could complete it within a short time frame and as such, could be administered during their free time. Thus, a Likert-type scale measurement method was used to assess the participants' responses. The questionnaires, designed to investigate the students' opinion (those selecting or rejecting HCPs), were divided into six sections:

1. Demographics and general information of each student, such as gender, place of residence, occupation, and education status of parents, number of siblings, etc.
2. Questions examining the students' perceptions and attitudes regarding the VTS attendance compared with the lyceum school.
3. Likert scale style questions concerning the personal impression of students for studies at VTS.
4. Likert scale questions asking to what extent students agreed with the level of quality of education offered at a VTS.
5. Questions asking students' impressions concerning the facilities at a VTS.

6. Questions investigating the various factors influencing students' decisions regarding their further studies and selection of professional direction.

Before proceeding with the distribution of the questionnaire, both questionnaires were pilot tested. The aim of the pilot test was to refine the questions in securing the questionnaires' accuracy, validity, and reliability (Yin, 2017). The questionnaires were pilot tested with HCP related researchers, lecturers, and specialists due to their having extensive experience in research design and questionnaire development. Due to their professional experience, educational background and level as well as expertise as pilot test participants, the appropriateness of the questions was readily confirmed. Thus, all statements and questions were tested so as to ensure the study respondents would not face a problem with answering the questions and the data collected would fulfil the research objectives.

The survey questionnaires were administered via a face-to-face format from May to June 2017 as well as in September 2017. The purpose of the study was clearly explained to the students and the need for the proper completion of the questionnaire in securing the validity of the research was also clearly highlighted. The questionnaires were completed during the students' school free time. The time required for completing the questionnaire was approximately 10-15 minutes.

4.3. Data collection, processing, and analysis

The survey was distributed to the students at the end of the 2016-2017 school year and the beginning of the 2017-2018 school year. At the end of the survey, all answered questionnaires were checked for consistency and completeness. Incomplete questionnaires were noted. The categories and groups of responses were numerically coded for computer analysis using EXCEL and SPSS software. This analysis package was considered appropriate as it was available to the researcher.

5. RESULTS AND DATA ANALYSIS

5.1. Students selecting HCP (VTS students)

The normality of the responses was tested using the Shapiro-Wilk of normality. The aim was to determine parametric or nonparametric tests should be used in comparing variables. Based upon the results, it was concluded that the answer distributions were not parametric ($p < 0.05$). Since all answers were non-normal, nonparametric testing in the form of Wilcoxon, Kruskal-Wallis, and Mann-Whitney U instead of the parametric t-test and ANOVA was performed for comparisons between the grouping variables. The Mann-Whitney indicated 13 questions where responses between male and female participants were significantly different (Table 1). Since Mann-Whitney is a nonparametric test based on differences in the median rather than

the mean, the mean values were also calculated for the 13 questions to distinguish the direction of these differences (Table 2).

TABLE 1: MANN-WHITNEY TEST FOR DIFFERENCES IN RESPONSES BETWEEN DIFFERENT GENDERS

Questions Determined by Gender	**Mann-Whitney**	**p-value**
Perception / impression after study at VTS	86.000	.005
Aspect of theoretical lessons of HCP	93.500	.010
Perception of Technical School teachers	87.000	.005
Tech. Schools provide students with all requirements for future employment	93.500	.013
Tech. Schools' students have better chances of lyceum's students for employment	65.000	.000
Tech. School's students can find a decent job	86.000	.006
Tech. Schools considered to be school of "secondary choices"	98.500	.022
Tech. School's students are treated negatively against lyceum's students	98.000	.019
At Tech. Schools study only "weak" students	95.000	.015
Consultant	103.500	.032
Family	101.500	.029
Colleagues	106.000	.038
Teacher of technical school	75.500	.003

As determined by the Mann-Whitney, the mean responses of the female participants were higher on the scale for all answers except for the two questions of technical schools' students are treated negatively against lyceum's students and at technical schools, study only "weak" students where male respondents' mean answers were higher on the scale. The Kruskal-Wallis regarding differentiation in answers according to the grade achieved in technical school only pinpointed one question as statistically significant.

Further investigation using cross tabulation and a chi-square indicated that this was because of a single negative answer in the 10 – 12 grade group. When the same Kruskal-Wallis was performed to find differences between answers according to the grades achieved at high school, four questions were pinpointed and more specifically the questions: (a) Perception, (b) impression after study at VTS, (c) VTS's students have better chances of lyceum's students for employment, and (d) VTS's students can find a decent job. A further investigation, cross tabulation and a chi-square revealed that these differences were due to higher responses for lower grade achievers.

When the same Kruskal-Wallis was performed to find differences between answers according to the family income, one question was pinpointed, Aspect of education offered at a VTS. Further investigation using cross tabulation and the chi-square revealed that these differences were due to higher responses for lower family

income. Finally, additional Kruskal-Wallis as well as cross tabulations with chi-square indicated that the parents' education did not significantly affect any of the students' responses.

Using the students' gender as the grouping variable, the Mann-Whitney was performed for all ordinal data and a chi-square test for all the nominal data. No significant difference was observed in any of the responses ($p > 0.05$). Similarly, the fathers' education and the mothers' education were used as the grouping variables and a Kruskal-Wallis was performed for the ordinal data and chi-square for the nominal data with no significant difference in any of the responses ($p > 0.05$). Since no statistically significant differences were found, the descriptive statistics of ordinal nominal variables were examined to define the central tendency and variability of the whole sample (Table 3).

TABLE 2: DESCRIPTIVE STATISTICS FOR THE QUESTIONS FOUND TO HAVE DIFFERENCES BETWEEN GENDERS

		Statistic	S. Error
Perception / impression after study at VTS	Boy	3.72	.196
	Girl	4.57	.137
Aspect of theoretical lessons of HCP	Boy	3.52	.154
	Girl	4.21	.187
Perception of Technical School teachers	Boy	3.32	.206
	Girl	4.21	.114
Tech. Schools provides students with all requirements for future employment	Boy	3.40	.216
	Girl	4.29	.221
Tech. Schools' students have better chances of lyceum's students for employment	Boy	3.88	.218
	Girl	4.93	.071
Tech. School's students can find a decent job	Boy	3.72	.212
	Girl	4.57	.228
Tech. Schools considered to be school of "secondary choices"	Boy	2.76	.226
	Girl	3.79	.381
Tech. School's students are treated negatively against lyceum's students	Boy	2.92	.191
	Girl	2.00	.314
At Tech. Schools study only "weak" students	Boy	2.80	.277
	Girl	1.71	.286
Consultant	Boy	2.56	.383
	Girl	4.07	.588
Family	Boy	3.52	.462
	Girl	5.21	.547
Colleagues	Boy	2.56	.366
	Girl	4.14	.636
Teacher of technical school	Boy	2.80	.392
	Girl	5.07	.579

Three questions were identified as significantly affected by family income: (a) Aspect of lessons offered at VTS, (b)Lecture's Classes, and (c) Laboratory Facilities. Box plots were constructed for these three questions using the family income as the grouping variable to identify trends. When examined using the chi-square with the family income as the grouping variable, none of the nominal variables were found to have a statistically significant difference between different family income groups ($p > 0.05$).

TABLE 3: DESCRIPTIVE STATISTICS FOR ORDINAL DATA

	Statistic	Std. Error
General impression for VET	3.70	.122
Aspect of existing students of VET	3.30	.135
Aspect of lessons offered at VTS	3.58	.126
Aspect of education offered at VTS	3.49	.135
Perception of Technical School teachers	3.73	.134
Tech. Schools provide students with all requirements for future employment	3.84	.123
Tech. School's students have better chances of lyceum's students for employment	3.46	.151
Tech. School has positive aspect in society	2.84	.136
Tech. School's students have same chances for university access as Lyceum's	3.13	.150
Tech. School's students can find a decent job	3.52	.126
Tech. School's students can establish easily their own business	3.49	.130
Tech. School's students can find a job in the public	3.06	.149
Tech. Schools considered to be school of "secondary choices"	3.52	.143
Students of Tech. Schools feel "lower" against Lyceum students	2.73	.153
Negative comments for VET are responded in reality	2.87	.152
Positive comments for VET are responded in reality	3.12	.135
Tech. School's students are treated negatively against lyceum's students	2.99	.143
At Tech. Schools study only "weak" students	2.52	.148
The Tech. Schools offer variety of educational programs	3.36	.129
Tech. Schools expect technical Knowledge offer general knowledge as well.	3.39	.139
Students of Tech. Schools feel "senior" against Lyceum students	2.37	.170
Lecture's Classes	3.07	.133
Laboratories facilities	3.22	.146
Athletics facilities	2.97	.156
Transportation facilities	3.09	.154
Consultant	3.19	.255
Family	4.19	.258
Colleagues	3.00	.264
Teacher of high school	2.97	.253
Teacher of technical school	2.97	.266

The ordinal variables were also examined for statistically significant differences between students with different grades at high school. This grouping variable was shown to be the most important determinant of ordinal variables since there was a statistically significant difference in five questions (i.e., General impression for VET, Aspect of existing students of VET, "Aspect of education offered at Tech, Tech School has positive aspect in society, Students of Tech feel "senior" against Lyceum students). To pinpoint the direction and any possible trend in these differences, the five questions were investigated further by calculating their descriptive statistics (see Table 4). Finally, the grades in high school were cross tabulated against all nominal variables and chi-square statistics were calculated with the question: "perception of technical school teachers", to be significant.

Students rejecting HCPs (lyceum students). None of the answer distributions were parametric ($p < 0.05$). Since all answers were not normal, nonparametric testing in the form of the Wilcoxon, Mann-Whitney U, and Kruskal-Wallis was performed in order to compare grouping variables. The chi-square used in defining categorical data and the Fishers exact test used for examining cross tabulation of categorical data with small group cells were also conducted.

TABLE 4: DESCRIPTIVE STATISTICS FOR THE QUESTIONS WITH STATISTICALLY SIGNIFICANT DIFFERENCES BETWEEN STUDENTS WITH DIFFERENT GRADES IN HIGH SCHOOL

	Grades at high school	Mean	Std. Error
General impression for VET	A-B	3.21	.282
	B-C	3.54	.147
	C-D	3.85	.233
	D-E	4.50	.267
Aspect of existing students of VET	A-B	3.00	.254
	B-C	3.00	.217
	C-D	3.65	.221
	D-E	4.00	.267
Aspect of education offered at Paralimni Tech	A-B	3.00	.265
	B-C	3.33	.187
	C-D	3.85	.221
	D-E	4.25	.366
Tech School has positive aspect in society	A-B	2.21	.211
	B-C	2.88	.193
	C-D	2.95	.235
	D-E	3.88	.398
Students of Tech. School feel "senior" against Lyceum students	A-B	1.68	.242
	B-C	2.38	.254
	C-D	2.55	.320
	D-E	3.63	.532

Students' gender was used as the grouping variable and a Mann-Whitney was performed for all ordinal data and a chi-square for the nominal variables. No significant difference was found in any of the responses for the ordinal data ($p > 0.05$). For the nominal data, one question, enough information provided for VTS, was found to be significantly different between the two genders both by the Pearson chi-square as well as for the Fishers exact test for small cells since some of the expected cross tabulation cells were noted to have a frequency less than 5. Because of the lack of significant results, especially in the ordinal data, descriptive statistics were calculated in order to see the central tendencies and variations regardless of grouping (Table 5).

TABLE 5: DESCRIPTIVE STATISTICS FOR ORDINAL DATA

	mean	**p-value**
Perception / impression before study at VTS	3.46	.157
Aspect for students study at VTS	3.44	.156
Aspect for the general environment of VTS	3.20	.153
Aspect of education level offered at VTS	3.24	.151
Perception of Technical School teachers	3.24	.174
Tech. Schools provide students with all requirements for future employment	3.56	.152
Tech. School's students have better chances of lyceum's students for employment	3.46	.207
Tech. School has positive aspect in society	2.66	.162
Tech. School's students have same chances for university access as Lyceum's Students	3.24	.184
Tech. School's students can find a decent job	4.39	1.007
Tech. School's students can establish easily their own business	3.44	.207
Tech. School's students can find a job in the public	2.95	.197
Tech. Schools considered to be school of "secondary choices"	2.90	.215
Students of Tech. Schools feel "lower" against Lyceum students	2.37	.187
Negative comments for VET are responded in reality	2.41	.175
Positive comments for VET are responded in reality	3.05	.264
Tech. School's students are treated negatively against lyceum's students	2.41	.194
At Tech. Schools study only "weak" students	2.22	.193
The Tech. Schools offers variety of educational programs	2.85	.190
Tech Schools expect technical Knowledge offer general knowledge as well.	3.24	.184
Students of Tech. School feel "senior" against Lyceum students	2.27	.218
Consultant	2.93	.297
Family	3.15	.311
Colleagues	2.80	.297
Teacher of Gymnasium school	2.56	.254
Teacher of technical school	2.49	.303

Similarly, the frequencies of the responses to yes-no binary questions were reviewed to identify any possible trends (Table 6). The fathers' education was examined to determine whether it significantly affected both nominal and ordinal data. The examination using chi-square indicated that none of the nominal data was affected, but two questions in ordinal data were found to be significantly affected ($p < 0.05$) using Kruskal-Wallis. These two questions were Aspect for students' study at VTS and VTS's students have same chances for university access as lyceum's students. The specific differences were then reviewed using box plots. The mothers' education level was also examined to determine whether it was significant with respect to both the nominal and ordinal data, which is was significant regarding Students accessing universities ($p < 0.05$).

TABLE 6: DISTRIBUTION OF YES-NO NOMINAL VARIABLES

	Yes	**No**
Believe of Technical School Position	28	13
Believe of High School Teacher's perception for Technical School	21	20
Believe of Technical School rules & regulations	22	19
Believe that in Technical School study "weak students"	4	37
Knowledge of competitive advantage for Tech. students accessing universities	23	18
Believe for competitive advantage for Tech. students for employability	30	11
Believe of better perspective of jobs for VET	34	7
Role of family profession in future student's choices	14	27
Believe of enough information provided for Lyceum School study	32	9
Enough information provided for Paralimni Tech. School Programs	33	8

Moreover, when ordinal data was investigated using the Kruskal-Wallis, three questions were identified as being significant ($p < 0.05$) by the variable, mothers' education. These questions were VTS students have same chances for university access as lyceum's students, VTS can establish easily their own business, and VTS considered to be school of "secondary choices." The specific differences were reviewed using box plots as to whether the family income level was significant for the nominal and ordinal data. However, none of the nominal data was found to be significant based upon chi-square, two questions involving ordinal variables were found to be significant ($p < 0.05$) using Kruskal-Wallis. The questions of significance were VTS students have better chances than lyceum students for employment and negative comments for VET are responded in reality.

Lastly, the grouping variable, grades, was tested using chi-square for the nominal data and Kruskal-Wallis for ordinal data. The grouping variable, grades, did not affect the ordinal data, but did have significance ($p < 0.05$) nominally. The three nominal questions were belief of enough information provided for lyceum school study, VTS

students can establish easily their own business and at VTS study only "weak" students. The specific differences were then assessed using box plots. The test revealed that VTS students could easily establish their own business with grades was a grouping variable.

6. DISCUSSION AND CONCLUSIONS

The findings from the statistical analysis and interpretation reconfirmed the literature and related data that "VTS students are treated negatively compared to lyceum students and mainly "weak" students attend VTS' (Symeou, et al., 2004). Over the last decades, VTS have had a rather "notorious" (Zopiatis and Kyprianou, 2006, p. 40) reputation and stigmatization of being the logical alternative for individuals with low academic qualifications. Even today, VTS are considered a shelter for students who choose vocational courses which prepares them for employment in technical professions. HCP fails to attract students with high academic and school performance; although it was acknowledged in the literature that males' preferences for VTS as well as the findings from the study indicating that girls are more positive than boys towards VTS with higher answers in positive attitude questions and lower answers in negative attitude questions. This could possibly be attributed to the higher level of psychological bullying posited by Symeou, et al. (2004) that boys face through peer ridicule.

Students who select to study at VTS feel that they received sufficient and accurate information; thus, an informed decision was made prior to their program choice. Also, academically weak students are more satisfied with their choice to study in a VTS despite their possible initial reservations and negative expectations. The practical nature of the VTP offered them an opportunity and accessibility to higher grades due to the assessment of practical skills and competency development than the theoretical courses. The study revealed that students are confident that upon their graduation from a VTS they will have more direct job opportunities and a better employment than lyceum students (see also Kotsikis, 2007). Research findings revealed as well that self-respect and self-portrayal upon graduation is increased among VTS graduates compared to initial decisions to study at a VTS. In addition, lyceum students who have a positive attitude towards VET appear, from the findings, to have the general impression that VTS graduates have the same or even better employability chances in the future. This could be explained the current economic status of the country and the financial crisis. Theoretical based jobs (white collar) have been seriously affected and at a higher level than technical jobs (blue collar).

However, this conclusion requires even more investigation as the research findings indicated that the family income is, primarily, the major reason for a student to select or reject a VTP. An economically stable family that has not been seriously affected by the financial crisis may reduce a student's stress for future employment opportunities.

Due to immediate employability independence and a diminished interest in technical jobs may lead students to reject VTP or VTS. Consequently, it appears that students who selected to study at VTS and VTP are usually from families with low income levels and the parents' income level was found to be related with the parents' educational level. The educational level of the parents of students studying at VTS and VTP is very low and thus no statistical results were identified based on their parents' education. More specifically, 25% of the parents were reported to be primary education graduates, 30% high school graduates, 35% gymnasium graduates, and only 10% graduated tertiary education.

Similarly, the research findings showed that parents of students studying at a lyceum have a much higher level of education than the parents of the students studying at VTS. Also, lyceum students responded to having not yet formed an opinion about VTS and as a result, their answers were generally neutral. Therefore, the findings of this study indicate that lyceum students do not necessarily have sufficient information and a positive image about VET, and VET was likely not promoted by school counselor in gymnasiums.

A fundamental conclusion is that the last word about where the students will continue their studies lies predominantly with their parents as well as the effectiveness of VTS in terms of accurate and sufficient communication of information should be intensified towards parents. This conclusion is supported by the fact that families with higher incomes have a negative opinion and attitude about the facilities offered by VTS and the courses offered, which enhances the fact that the parents' education and briefing should be improved.

Weaker gymnasium students had a better opinion and attitude towards VTS. This conclusion is more likely be related to the sufficient availability of accurate and reliable information with regards to positive outcomes from VET, such as job opportunities in that this could persuade stronger students to also consider attending technical schools. Finally, weaker students attending the gymnasium felt that their teachers have a negative opinion and attitude towards VET and VTS because they think that only weak students "end up" in technical schools, whilst better students feel the opposite, which could imply a psychological coercion of weaker students by gymnasium teachers.

The student population that chooses or follows VET because of necessity are mainly of low school performance and have parents of low education levels. The main characteristic of these students and their family environment is the fact they consider VET as a second-class educational choice (Paidousi, 2016). Vocational education has been generally associated with less prestigious education, typically seems to be about "other people's children" (Hyland, 2014) and is commonly viewed as one of the weakest areas of the educational system. However, tourism is one of the world's leading employment creators. Therefore, in order to foster the sector's greater capacity to create jobs, the World Tourism Organisation works closely with its member states

towards providing quality education and training among tourism professionals and stakeholders (UNWTO, 2016).

Summarily, the results of this thesis revealed that the objectives were met to a large extent. Furthermore, the results and conclusions reached have been shown to be important and valuable because they can be used for future research as well as applied in practice to improve the negative image that prevails in Cyprus concerning technical education. Through this research study the focus was to highlight some strategies and suggestions in order to improve the attractiveness of the HCP using a descriptive, mixed method study research design. VET should not be considered a shelter for 'weak' students, but win the position it deserves within the educational system.

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HUMANISM AND SOVEREIGNTY: A STUDY OF THE RELATIONSHIP BETWEEN SCIENCE AND TECHNOLOGY AND INTERNATIONAL RELATIONS

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ABSTRACT

The following paper studies several effects of the interaction between Science and Technology and socio-political actors and policy makers within the last century and within a historical context. The effects are presented in predefined positive and negative categories. Positive elements include the establishment and maintenance of connection between actors, the righting of perceived past mistakes, and support of increased adherence to humanistic attitudes and pursuits based on scientific universalism. Negative elements include Science and Technology sustaining explicitly hard power or military threat to what may otherwise result in diplomatically peaceful political connection, failure to overcome fallacies within human nature, and high costs deterring under-developed nations from attaining high political standing in the international arena.

Keywords: *Science and Technology; International Relations; Science Diplomacy; Hard/Soft/Sharp Power; Universalism; UN; UNESCO; World Wars; Nuclear Warfare; Space Exploration; Communication Technologies; Cuban Missile Crisis, China, US.*

1. INTRODUCTION

The explosive nature of scientific and technological development in the 18th to 21st centuries has affected the conduct of governments in the international arena. Nations around the globe that are currently key international actors rely heavily on continuous scientific research and development in advanced communication technologies and artificial intelligence as means to gain international leverage. This is the result of a continuity of industrial, military, civil, medical and eventually information technology innovation. The beginnings of such innovation had seemingly cemented the economically and politically dominant position of nations in the West/North, such as the United States and the United Kingdom, in the international order. Yet, through the thorough forces of globalization, it has spread to nations of the East/South eager to catch up, with China and Russia taking the lead, all while facing growing concern over universalizing perspectives, such as those rooted in human rights and embodied in the establishment of prolifically humanism-oriented International Organizations within the last century (Baylis, Smith and Owens, 2014; Singh, 2011). This paper, aims to provide an analysis of the ways in which the natural sciences and the socially and politically bolstered technological developments based on them, have affected

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International Relations, with the effects divided into (albeit overlapping) positive and negative categories as defined in the following section.

2. DEFINING KEY THEMES

Determining what the terms 'positive' and 'negative' mean in this case requires a working definition of International Relations. For the purpose of this paper, this definition will be the active establishment of formal political connection between nations and individuals of diverse cultural, social and political backgrounds, regardless of whether this connection results in mutually beneficial relationships, in perpetual power play or in overt conflict. Positive aspects will be those that, whether directly or as part of a process, allow for connections to be established, to remain active or to evolve, for example via the opening and maintenance of new forms of communication channels that allow all parties involved to participate as freely as they may wish (such as by allowing for support and means of freedom of speech) and help to diversify methods of diplomatic interaction that the communicating sides may wish to experiment with. On the other hand, negative aspects are those that undermine or eliminate the mentioned connections, such as by diverting communication from topics of concern or by silencing individuals wishing to voice opinions that are in great contrast with dominant rhetoric. This can be seen in the respective cases of allowing for the promulgation of false information and in the promotion of the escalation of warfare, and the resulting increase in the deaths of those unable to defend themselves or not wanting to participate in the events at the outset and actively opposing the events' continuance/escalation.

Technological innovation dates back to the beginnings of human civilization long before the emergence of the concepts of 'nation" or "nation-state" and thus international relations, beginning with the earliest tools for agricultural production, writing, religious sacrifice, etc. Gradually technology began to influence political and commercial relations and the social sphere by aiding humans to grow in number, spread across the globe, restructure social hierarchies and interact amongst ever culturally diversifying groups over the course of millennia (Trigger, 2003). This temporal continuity of technological innovation resulted in the emergence of modern scientific practice, which in turn aided and was simultaneously prompted by globalizing forces, such as expanding communication channels, an increase in commercial competition to accommodate consumer demand, and the reduction in international trade barriers that came with it (Garrett, 2000). As history progressed, Science and Technology became synonymous with the rapid economic development of nations and rose in the various forms of their political power in the international arena. A leading example is China applying scientific research and technological development as ways of exerting soft and sharp forms of power (Lai and Yu, 2012; Veugelers, 2017; Walker and Ludwig, 2017; Cook, 2013)[1]. These forms of power are

rising in value for a nation aiming to elevate and maintain its standing in the international arena, as it has done via historically traditional forms of power, namely hard power behind military conquest and efforts towards economic superiority. For the sake of argument and simplicity, the following paper will focus on specific events in the last century which were made possible by the explosive development of Science and Technology commencing in the 18th century within the Industrial Revolution, and gradually spreading around the globe from West to East, growing exponentially in the last 40 odd years (Freeman and Soete, 2009). It will examine a variety of ways in which Science and Technology have been affected and been affected by international power play and diplomatic interactions as witnessed during those events.

a) The Positive elements - connection

Arguably, the most evident and initial way in which Science and Technology have significantly contributed to the evolution of International Relations is via the industrial sector, as shown by the unprecedented growth in the industries of nations and therefore their standing in a global economy throughout the 18th - 19th centuries eventually leading to increased leveraging power in the international arena (Krishna-Hensel, 2010). Such growth resulted in the possibility of economic advantage deriving from industrial strengths tying into the second contribution - political advantage in the form of the development of military technologies and the resulting changes in the effectiveness with which nations are able to apply hard power tactics, as demonstrated during the World Wars and how they ended with the help of an industrially thriving United States. The third contribution is the momentous arrival of the information age and of new modes of communication that have allowed nations to establish diverse and widespread connections along cultural, political and social channels. It is this notion of connection that is common to all aspects and is evident in other attempts to create typologies of the impacts that Science and Technology have on International Relations. A case in point is Charles Weiss' four key impact mechanisms - changes to international system architecture, changes to processes of international system operation, creation of new issue areas and constraints, and alteration of perceptions and creation of ideas, theories and knowledge via the creation of new sources (Weiss, 2005). None of these changes would be possible without Science and Technology allowing for connection and resulting in extensive interaction between various significant actors in the international arena. Pierre-Bruno Ruffini takes it a step further and presents a variety of arguments that shed light on Science acting as a soft power connection in itself and in the form of what he terms Science Diplomacy (Figure 1). One of the key arguments is that political neutrality and objectivity in the advancement of knowledge are intrinsic to methodologies employed in scientific research and the development of technologies. These characteristics may be emulated in diplomatic interaction based on the pursuit of Science-and-Technology-oriented

international relationships, thus resulting in a detachment from conflict that may hinder the establishment of communication channels and result in military conflict (Ruffini, 2017). Diplomatic processes can become more smooth and diverse, with mutually beneficial relations between researchers and diplomats allowing for scientific transnational influence on foreign policy developments and on the implementation of global governance directives. Put simply, Science and Technology allow for the establishment of "cooperation as a way to harmonious links between states and peoples," in line with the tone of the United Nations sub-organization the United Nations Educational, Scientific and Cultural Organization, or UNESCO.

FIGURE 1: RUFFINI'S TYPOLOGY OF THE RELATIONSHIP BETWEEN SCIENCE AND DIPLOMACY

	Diplomacy for Science	**Science for Diplomacy**	**Science in Diplomacy**
Expression	Intergovernmental agreements on scientific cooperation	Parallel diplomacy (Track 2 diplomacy)	Scientific expertise
	Action of scientific and technological networks	Science Envoys	Science-policy interfaces
Advantages for diplomacy	Promoting cooperation as mode of relations between states	Support to the normalization of diplomatic relations	Better understanding of global issues
	Influencing through science		Assistance with the preparation of multilateral negotiations
Advantages for science	Support for the creation of large research infrastructures	Expression of scientific patriotism	Capability of influence on major societal choices
	Support of diplomatic networks to the internationalization of research (mobility, visas. . .)	Influence on the governance of international territories	Social recognition of science

Source: Science Diplomacy and its Benefits to Stakeholders, (Ruffini, 2017).

b) The Positive elements - learning from mistakes

However soft the power of Science Diplomacy may appear, technological development allows for a far more direct approach to molding the nature of International Relations and affairs. The physical world is studied by scientists for scientific research deductions and the results are applied by engineers to create

technologies that politicians, who are uninhibited in the pursuit of their own state interests, are willing to use for manipulation of opinions on and of events occurring in other nations in a manner that inhibits global humanistic relations based on moral and ethical concern over elements of universal human rights such as freedom of speech and belief and freedom from fear (*Universal Declaration of Human Rights*, 2015). This manipulation may be of a military nature, whether via direct warfare or proxy wars and referred to as hard power, or in the form of sharp power - control over ideology and political opinion as exerted via telecommunication and digital information technologies in the domestic and international spheres (further discussed in the section *d) The Negative Elements - Direct threat*) (McNeill, 1982; Walker and Ludwig, 2017)[2].

Hard power tactics have provided striking lessons on the dangers Science and Technology pose. While wars continue to rage and the development of military technology does not cease, historical events, such as the development of nuclear and chemical warfare technologies during and after the World Wars and their application leading to mass deaths, have altered perception on the necessity to assign and enforce limits to application of such powerful technologies in international intervention. The application of nuclear weapons in Hiroshima and Nagasaki has shown that Science has the potential to bring extensive destruction to infrastructure, countless deaths and extensive medical complications for future generations if used in an unchecked manner (Blot and Miller, 1973). The Cuban Missile Crisis and the way it brought mankind to the brink of a global nuclear war further increased widespread concern over the proliferation and potential use of nuclear weapons (Hillstrom, 2015).

The establishment of a direct channel of communication, the Nuclear Hotline, between the leadership of the United States and the Soviet Union, a move towards transparency that would limit the application of advanced military technology, meant that Science and Technology led to International Relations being used as a means to right wrongs committed by nations and an attempt to avoid repeated mistakes. This has been achieved on a multilateral plane by way of establishment of international organizations like the United Nations, disarmament efforts and arms control through agreements like Strategic Arms Limitation Talks in the post-war period, via which issues previously were dealt by the most powerful nations and commonly internally (if the issues were perceived as domestic purely due to their geographic location or geopolitical nature) have been internationalized due to their intrinsic nature of concerning humanity as a whole. Thus, humanist ideologies have and are being actively brought to the forefront of rhetoric in International Relations, as discussed below.

c) The Positive elements - Universalism

Science and Technology have played an indelible role in building an environment conducive to the development of new modes of relations in the international sphere that revolve around the necessity to promote and maintain peace in ways dictated by the World War victors, the Allies and the United States (Singh, 2011). During the inter-war period, Science was the basis for the establishment of UNESCO's predecessor organizations. The Geneva-based International Committee on Intellectual Cooperation (ICIC, 1922-1946), a sub-organization of the League of Nations that was tasked with the promotion of exchange, development and restructuring of knowledge via a network maintained by the Paris-based International Institute of Intellectual Cooperation (IIIC, 1926-1946), and the Geneva-based International Bureau of Education (IBE, 1925-1968, later merged into the UNESCO Secretariat) (Grandjean, 2016). Via these international organizations, Science became a basis for improving international cooperation with the aid of a network connecting libraries, universities, archives, art and cultural establishments, communication centers and media outlets, and other organizations concerned with intellectual property, though ultimately primarily focusing on bringing together key individuals with scientific backgrounds like Marie Curie, Albert Einstein, and George Hale (Laqua, 2011). The failures of these organizations in promoting and maintaining peace and the genocidal horrors of the Second World War led to the post-war establishment of International Organizations, namely UNESCO, aiming to promote new humanistic modes of International Relations on a gradually global scale inclusive of all nations.

As prescribed by Julian Huxley, the ultimate purpose of UNESCO would be to open effective channels of communication that would ideally overcome dogmas that plagued relations of the West with the East, and eventually of the North with the South (Huxley, 1946; Murphy, 1947). This was to be done by adhering to a humanistic philosophy of education being able to overcome aspects of human nature that cleave to overt subjectivity and will for violent action as a quick resolution of conflict. Education would allow worldly views of heightened understanding and acceptance to permeate the minds of citizens, legislators, policy makers, scientists and technological innovators, educators, politicians and diplomats alike. This would in turn lead to an improvement in their attitudes to human diversity and an evocation of deeper understanding, and an increasingly active adherence to fulfilling the need for promoting universal human rights. Furthermore, education would allow for practical adjustments of lifestyles towards being more respectful of these rights, as well as making thought processes more malleable and conducive to peaceful coexistence and fair solution to global issues. However, the pursuit of scientific research and technological development is an expensive and complex undertaking that requires the participation of individuals with a well-established basis of acquired knowledge. This resulted in UNESCO focusing on education and culture more than on advanced

scientific research and technological development. Moreover, UNESCO's efforts have not been able to withstand pressures of politicization, as shown by the end of the Fundamental Education program as a result of Cold War tensions (Dorn and Ghodsee, 2012).

Despite setbacks, Science and Technology have acted as a basis in the second half of the 20th and beginning of the 21st century for the attempted establishment of a new world order in which global governance is no longer exclusively shaped by the hands of a select few elite superpowers with national political and economic interest dominating their actions. This in turn has led to an attempted reformatting of the nature of International Relations in which the sovereignty of nations is generally respected while not being allowed to be exercised without at least some scrutiny as to the extent to which the nations' actions have on the planet and humanity as a whole. The emergence of Sustainable Development shows that the international arena is growing even more concerned with the integrity of life on our planet in the long-term with relations between nations increasingly revolving around decision-making processes that have global effects on all individuals, however minute. Previously nation-centric concerns become universal concerns and vice versa, as demonstrated by the educational and advisory efforts of International Organizations, such as the United Nations' Sustainable Development Goals, and how the necessary changes to production methods and consumption patterns are expected to be effectively implemented on a local and national scales (Transforming our world, https://sustainabledevelopment.un.org/post2015/transformingourworld). Furthermore, Science and Technology allow for far-reaching communication channels and swift journalistic dissemination of information via digital technology, shedding light on previously hidden controversial actions by governments and groups within national borders, not only by giving a voice to the previously silenced, but also by allowing other nations to state their concern and, to an extent, influence the course of action within the nation borders (Weiss, 2005; Romano, 2002).

A final way in which Science and Technology have presented themselves as yet another promoter of successful international relations is in the form of cooperation in the field of Space exploration. While many nations have their own Space programs, the International Space Station is an example of what started as a competition during the 'United States versus the Soviet Union' Space race era evolving into a means for nations to undertake scientific endeavor in a hostile environment where not only do national borders technically do not exist but intelligent and objective cooperation is required for survival and progress as well (Al-Rodhan, 2012). This results in a necessitated detachment from politicizing forces, making Space a neutral environment in which conflict that may hinder International Relations on political, cultural and social grounds is overcome by the need for survival via the maintenance of a delicately balanced living and working environment for a selected few.

d) The Negative elements - direct threat

The most evident threat posed by Science and Technology is their prolific application in the development of weapons of mass destruction. When viewing International Relations from the hard power approach it may seem that Science and Technology allow for effective international connection between nations in the most open manner of providing resources for warfare, be it for swift resolution or prolonged manipulation of conflict sources and activities. When nations engage in military interaction and move away from peaceful, diplomatic resolution of said conflict, Science and Technology may be viewed as contributing to the undermining of the connections that stabilize International Relations. This is done by posing as direct threats to the lives of individuals who actively maintain these connections through diplomacy (key political actors and diplomats), as well as the lives of those who maintain the integrity and functionality of the nation and its society as a whole that may be more conducive to a peaceful environment allowing for smooth diplomatic negotiation (such as members of the military defending the nation and powerless civilians). Scientifically and technologically advanced nations have the power to bypass traditional diplomatic channels that allow for peaceful conflict resolution and to resort to the application of force in a swift manner that far exceeds impact efficiency in destructive capability when compared to the warfare efforts of scientifically and technologically underdeveloped nations. A key example, as mentioned above, is the use of nuclear weapons in conflict resolution; the speed with which a level of destruction (with the purpose of weakening or restraining a warring rival nation without an equal nuclear capacity) that conventional warfare may take years to inflict is reduced to a virtual instant. This raises a concern over whether conventional warfare would better lead to a reduction of loss of innocent lives through negotiation that gradually shortens the duration of the conflict and allows for time to establish and strengthen communication channels which would help to maintain peace in the long run, as opposed to the application of a nuclear weapon leading to a swift end of a conflict, as in the case of a globally devastating war being ended by the United States dropping nuclear warheads on Hiroshima and Nagasaki. Justifications of such actions on moral grounds from a Western perspective are highly contested and the resulting horrors have led to world powers rethinking International Relations methodologies and challenging the necessity of the application of such drastic means that result in death and health issues for generations to come (Ruffini, 2017; Rauchhaus, 2009).

A more recent fruit borne by scientific and technological endeavor is Artificial Intelligence, which is increasingly being used to develop complex models that help to determine the best courses of action in the international arena (Schrodt, 1988). This begs the question of whether Artificial Intelligence poses a threat to human agency within International Relations decision making, and especially in the instance where

connection between two actors in conflict is bypassed altogether. While Artificial Intelligence is man-made and programmed to carry out specific commands in a manner similar to that of a soldier on the front lines, the case of Artificial Intelligence-controlled military aircraft being dispatched to a technologically backward nation makes the approach one-sided. Human agency becomes irrelevant during the time for interaction between opposing sides (Dixon, 2017). As a factor that ignores bi- or multi-lateral connections as one would find in traditional International Relations approaches, Artificial Intelligence poses a growing number of legal, ethical and moral concerns.

The imposition of hard power further threatens the neutral universalizing aspect of the relationship between Science and Technology and International Relations. The relative social, political and cultural neutrality of Space that provides the grounds for more objective diplomatic interaction, as discussed in section *c) The Positive Elements - Universalism*, is under threat due increased concern over national security. While Space exploration is, to an extent, removed from the earthly dealings of nations in its form of scientific research, perceived potential for militarization and weaponization of Space has resulted in the United States and China moving towards an alteration of this environment from one used for the building of International Relations connections to one that challenges them through warfare or a threat thereof (*Mark Release*, 2017; *Space Policy Directive-3*, 2018; Vasani, 2017; Ignatius, 2018).

e) The Negative elements - fallacies in human nature

This element is not one intrinsic to the natural sciences and the processes by which technologies are developed, but one related to their seeming powerlessness to overcome the nationalistic subjectivity that is demonstrated time and time again by actors in the international arena who insist on fueling research and development for continued pursuit of outcomes that are not different to those that are increasingly viewed as mistakes of the past. For example, pursuit of warfare as resolution to conflict and re-establishment of an environment conducive to peaceful, safe and prosperous living for civilians often perpetuates or results in loss of lives of the citizens and soldiers of the pursuing nation and of the nation with which conflict occurs, not to mention damage to infrastructure, socio-political upheaval and economic instability. If the gradual elimination of threat to the pursuing nation and its people is the ultimate purpose, reverting to actions that have such detrimental effects may seem irrational, even if lauded as a necessity in the form of a heroic loss of a few for the safety of many. Decisions towards pursuit of warfare may hide alternative reasoning, such as the maintenance of international power status of the nation. For example, the US efforts to maintain a world power status that was gained with the Second World War defeat of the Axis Powers led to confident pursuit of assumed victory during the Vietnam War, without the use of nuclear weapons but with the use

of the herbicide Agent Orange. This chemical weapon was considered for application during the Second World War but instead was left for inevitable application at a later date when the occasion for maintaining the US international political status and ideological power called for it, with possible long-term detrimental effects ignored as previously and fueling controversy in the aftermath (Young, 2009; Haberman, 2014). Science and Technology are continually applied for violent solutions to conflict.

On a less direct scale, connections in International Relations have been undermined by dissipation of false, manipulated information at the speed of light, whether purposefully or accidentally, yet made possible with the exponential growth and unregulated spread of digital communication technologies (Comunello and Anzera, 2012). In parallel with the application of evolving hard power tactics, Russia and China demonstrate a prolific application of media technologies in an effort to influence international ideologies via a newly termed form of power - sharp power (Walker and Ludwig, 2017; Cook, 2013). However, not as direct as hard power, the force of sharp power is being maintained and increased via print media being supplemented and replaced by digital means of information propagation. It has become a valued alternative for hard power due to its characteristic of allowing for the efficient manipulation of rhetoric and discourse in the international arena for the political benefit of the nation exerting the force of what may be viewed as new forms of propaganda (Ingram, 2016). Nations are able to undermine the reputations of other nations and thus their economic and political viability in the international domain via a power that is rapidly becoming more difficult to regulate because of the speed, suppression and permeability of information dissemination that is achievable via digital technologies. Such applications of Technology are in great contradiction with the very nature of the Science through which they were made possible and undermine the possibility for open and mutually respectful International Relations. This nature is the integrity of knowledge and information that prevents errors and delays in research and development as effectively as it promotes stable and trustworthy connections between political actors.

Another example of the fallacious human factor undermining the absolute nature of the physical world, as it is studied via scientific research and emulated in the precision that is pursued in technological development, is that consumption continues to grow despite scientific proof of (and ever growing public discussion on) human causes of climate change in the form of unsustainable mass production for commercial purposes. Over-consumption is fueled by obsession over material wealth and economic growth and is sustained by technological advancements despite evidence of the draining of natural resources and the overfilling of pollution sinks (Meadows, Meadows and Randers, 2011). While Sustainable Development Goals are zealously promoted, redirecting approaches to the fulfillment of the excessive wants of the socially, economically, and politically privileged at a time when needs for a significant portion of individuals are barely met (and when there is lack of certainty of whether

they will be met in the future) remains a hefty process on a global scale, requiring time and effort to alter the perceptions of the entire human race. Research shows that human beings are willing to cooperate for the sake of society on a global scale, overcoming individualistic pursuit under reciprocal terms that can withstand financial and environmental crises (Dembowski, 2016)[3]. Perhaps with the aid of hard science, this willingness could be promoted in times of peace and stability to bypass calculable crises that become increasingly avoidable.

f) The Negative elements - cost

With the realism of hard power at the core of International Relations as much as neoliberal ideologies that revolve around commercial pursuit, nations face a variety of challenges originating from scientific and technological, all of which boil down to availability of financial, natural and man power resources (Simon, 1995; Dahlman, 2007). As demonstrated by Dahlman, increased international competition, demand and speed of interaction and knowledge/financial/etc. exchange require efficient logistics and communication and information systems, components that are lacking in developing countries. The actions they can take depend not only on their political, social, economic structure, and level and pace of development, but also on international issues such as adjustment pressures, backlash against globalization and an ever increasing income gap between wealthy and least developed nations.

Research and development pursuits in Science and Technology are costly, leaving rich nations to monopolize the field and therefore hold political, economic and, to an extent, social (soft) power over poor nations ridden with poverty, reliant solely on aid, charity or the cultural industries sector for income, as promoted by the West/North-led international organizations like UNESCO and the support they receive from Non-Governmental Organizations funded privately by individuals with their own agendas that may not have humanistic pursuit as a primary concern (Information, Communications Technologies Have Tremendous Potential to Promote Development, Bring Countries out of Poverty, Economic Committee Told, 2009; Economy, *UNESCO Culture For Development Indicators*; Measuring The Economic Contribution Of Cultural Industries, *UNESCO Institute for Statistics*)[4]. While the cultural sector is a possible source of boosting an underdeveloped nation's Gross Domestic Product, persistent wealth inequality means that the poor do not have access to education based on Science and Technology to the advanced academic and research levels that nations with high or swiftly rising Gross Domestic Product estimates may have. This leaves them with limited leveraging and competitive power in the international political and economic arenas, as the scientifically and technologically advanced nations dictate the actions of those underdeveloped nations that have valuable resources to be exploited for the sustaining of the economic demands of the wealthy nations (Acemoglu and Robinson, 2012; Patrick, 2012).

3. CONCLUSION

The relationship between Science and Technology and International Relations allows for a better understanding of the complex nature of human interaction on a global scale and across a significant portion of our history as a civilization. This complexity comes in the form of a mélange of the continuity of age old International Relations methodologies, fluctuations in the form of direct challenging of International Relations dogmas and an essentially uncontrolled emergence of new forms of connections. This mélange results in hasty and subjective decision-making on the part of key actors like politicians and policy makers who are faced with perceived unavoidable time and ideological constraints. It is a complexity that often undermines the possibility of a key feature of documented scientific research and technological development processes, namely neutrality and objectivity, being emulated in the processes of International Relations. This may be due to perpetuated nation-centrism on part of the actors and their essentially self-concerned actions, as well as the sheer vastness of the globe not allowing for all asymmetries to be righted as effectively as the most humanistically-oriented actors may justifiably desire. The continuous emergence of issues to tackle and the growth of the number of individuals around the globe in need of guidance and education are unstoppable in their expanding nature. However, as humanism-oriented academics, researchers and policy makers are ever more adamant to find solutions to issues old and new alike (*New Frontiers in Science Diplomacy,* 2010), newly emerging perceptions of and approaches in International Relations that are embodied in novel fields, like Science Diplomacy, may hold the answers to issues that plague the international arena, while simultaneously boosting the aspects that make it favorable for peaceful and progressive interaction between nations.

4. NOTES

1. Lai and Yu (2012) criticize the view of soft power as being exerted only via culture and language, stating that Science and Technology play a large role in helping a nation attract respect from other nations.

2. For a history of the evolution of technological innovation as prompted by and applied in military pursuits, see McNeill (1982).

3. For the full study, see Messner and Weinlich (2016).

4. For a comprehensive criticism of Non-Governmental Organizations, see Choudry and Kapoor (2013).

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SOCIAL MEDIA ASSISTED BLOG CONTENT DISSEMINATION: A TWO CASE STUDIES APPLIED ANALYSIS OF RULING FACTORS

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ABSTRACT

After 15 years of digital existence, blogs have always been a constant gateway to the multifaceted realm of Social Media Networks. Bloggers around the world still locate their target groups within the blogosphere to diffuse their digital content, but now, Social Media networking sites are at their disposal to boost this process. Blog interlinking has been a simple method to support this diffusion process but now the situation is more complicated. The features and principles of this procedure can be highlighted through tests and monitoring. This paper aims to demonstrate the ways that Social Media networking sites can assist blog content promotion. Two separated tests are presented using blogs set up with WordPress and Blogger.com. The content has been promoted by using mainly Facebook and Instagram, two of the post popular platforms. Monitoring has been performed by using Google Analytics, SE Ranking and Facebook Insights in order to observe the traffic towards the testing blog post within a time, window within which the assisting networking sites have exerted their influence. The two case studies have demonstrated quantitatively the interconnection between multiple Social Media platforms and highlighted their potential contribution and the ruling factors towards effective digital content dissemination.

Keywords: *Social Media; Blogosphere; Social Media Monitoring; Blog Content Dissemination.*

1. INTRODUCTION

This paper investigates the factors that affect the diffusion of digital content over the online communities formed within the digital realm of the contemporary Social Media. One of the historically oldest gateways to this realm has been the numerous blogging platforms helping simple users around the world to initially enter the so called blogosphere and thereafter the Social Web.

Today, Social Media are forming a networked realm were all platforms are in a way interconnected and allow for sharing of information and the so called User Generated Content in a variety of ways. In this digital realm, the effective diffusion of

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information requires good knowledge of the mechanisms that affect effective promotion of propagation of digital information within social networks (Hu et al, 2017). Testing and trying new propagation models is part of all the recently introduced methodologies that are referenced in this field of research (Cuberti, 2016). These tests have introduced numerous suggested digital media strategies for online marketing (Sihi & Lawson, 2018), Social Media Campaigns etc. (Hanna et al., 2011). In these testing procedures, there are nowadays hundreds of free tools that every single content creator can use in order to acquire useful results in a variety of case studies.

In this paper, two separated case studies are presented where a blog post in each case is posted and different social media platforms are used at the same time to promote a blog post content diffusion in the Social Web. In this process, specific monitoring tools were used in each case in order to provide useful statistical information related to the diffusion itself and to therefore identify the factors that affect the publicity, popularity and influence of posts in the Blogosphere and social networking sites generally.

2. RELATED WORKS AND CONTRIBUTIONS

There have been many research attempts in the past that aimed in modelling the message propagation within Social Networks. Susarla and colleagues, inspired by the rapid growth and success of YouTube, found that social interactions within the Social Network of the platform were influential not only in determining which videos would become viral but also on the magnitude of that impact (Susarla, 2011). Bakshy and colleagues pointed out that by quantifying the causal effect of these mediums on the dissemination of information required not only identification of who influences whom, but also of whether individuals would still propagate information in the absence of social signals about that information (Bakshy et al, 2012). Therefore, they performed a diffusion experiment investigating among others the role of weak ties in Social Networks, which were found to play a more dominant role in the dissemination of information than currently believed. Balali and colleagues, took their investigation one step further and proposed a method of predicting content diffusion in Social Networks based on mental and behavioural patterns of users as well as the volume of comments on diffused as a measure of how well the content has attracted attentions (Balali, 2013). Having recognised the importance of the procedures above in processes like Opinion Leader Detection, BuzzDetection or Viral Marketing, Lagnier and colleagues proposed an innovative probabilistic model aiming to predict how a content diffuses in a network by making use of additional dimensions such as the content features, the users' profile and the users' willingness of further diffusing the content. Hu and colleagues further evolved this model into a memory-based deep recurrent network that learns to recursively predict the entire diffusion path of an image through a social

network, having been inspired by the rapid spread of social media sites like Facebook, Instagram, Twitter, and Pinterest.

In this paper, we aim in demonstrating quantitatively the contribution of advanced social networking sites such as Facebook and Twitter over content dissemination produced by one of the oldest forms of User Generated Content platforms: The Blogs. After 15 years of life, blogs continue to maintain their own share in the Social Media realm and are considered to be a standing gateway for content infusion in digital social networks. Therefore, this paper aims to highlight this reality and further inspire researcher in modeling the content diffusion paths emerging from the interaction between Blogosphere and other Social Media sites.

3. METHODOLOGY

The demonstration described in this paper is based on the simple idea of posting an article in the blogosphere and subsequently promote it with some Social Media sites infusions according to a planned timetable. During this process, the impact of the promotion actions had to be measured by a number of tools in order to numerically outline this process. The first tool that has been chosen to measure the impact of the articles was Google Analytics. The basic reason for this decision is the versatility for extensive analysis, which this tool offers. Google Analytics is a tool used to collect data from a website or mobile app. There are some simple steps that are necessary to follow in order to start using it. An account has to be created in order to sign in. Next, a property has to be created (website or app) and then a tracking code is given in order to be added to the website or app. A second tool that has been used was SE Ranking. It is a SEO platform which has features like keyword grouper, competitor research, backlinks monitoring, accurate ranking, marketing plan and website audit. It is developed for SEO professionals, website owners and digital agencies. It has to be underlined that its features are sometimes beyond the scope of this investigation and that it is not free. Therefore, an account was created so that the tool could be used for the 14 days' free trial period. Since Facebook has been used for the post promotion, Facebook Insights tool has also been used. This tool can help to track the number of users and allows for a closer look at the interactions with specific Facebook postings.

The publisher of case study 1 used a blog created by WordPress service, a content management system, which is simple but effective. The version used was WordPress 4.6.13. Regarding Case Study 2, both WordPress and Blogger.com has been used to create a blog where the testing post would be published.

Some main differences at the time of writing between WordPress.com, WordPress.org and Blogger.com platforms can be highlighted at this point. Regarding WordPress.com characteristics, it offered the possibility to sign up directly by going to WordPress.com site. It was possible to do this for free by choosing a recommended domain name. There was also the option to pay for a personal, premium or a business

plan. Compared to WordPress.com, WordPress.org was self-hosted. This means that a website should be purchased for hosting and then WordPress.org blog could be installed there. The main advantage is that no extra payment was necessary after that. Premium options could be used without limitations. Blogger.com offered everything for free. The themes were basic, but it was possible to upload own design or just edit the HTML code in order to obtain the most wanted configuration.

Finally, it must be noted that in order to avoid fake data, a filter was set up with the tester's IP address. Thus activities on the website could be filtered out and only the activities of external users could be considered.

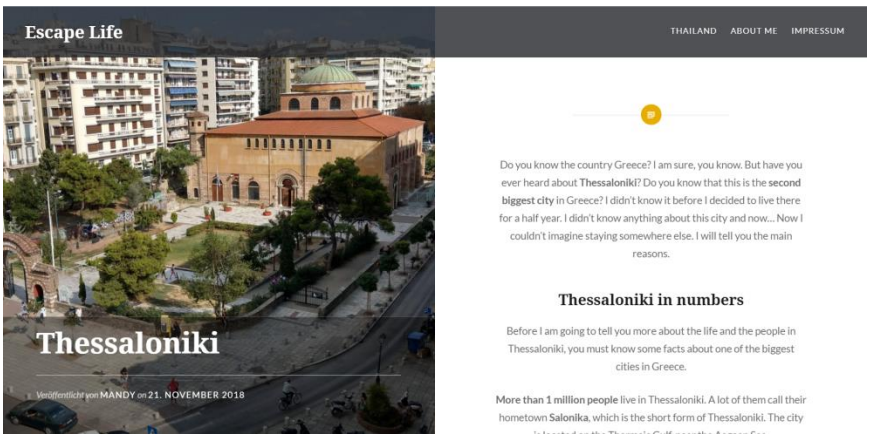
4. TECHNICAL IMPLEMENTATION

4.1. Case study 1

4.1.1. Content of the Post

In the first case study, a post in a personal traveling blog has been published. The general content of the blog included experiences and useful information, as well as places that the blog's owner has been. The testing article was about life in the city of Thessaloniki, the way of life and its habitants. It has been written in a friendly way aiming in sharing the owners' experiences with people that read the blog's posts. Several pictures are included in order to deliver a full description of the city and to produce a better reading experience (Figure 1).

FIGURE 1: APPEARANCE OF THE BLOG POST ABOUT THESSALONIKI



4.1.2. Selection of Social Media platforms

In order to promote this article, Facebook and Instagram social networking sites were chosen. One of the main reasons was the already existing business page of the blog's owner in Facebook and Instagram with approximately 2000 followers. Although Twitter is a very popular microblogging site, it hasn't been chosen within this test for the article advertisement because a Tweet has the shortest lifespan of all social media postings (Meissner, 2017). Other popular social media networks like LinkedIn or Xing were senseless to be used because the publisher's target group wouldn't search for this kind of content in these networks. Without videos a posting on YouTube is pointless as well.

According to the literature (York, 2018) and to the previous experience of the publisher, the best time for a posting in Facebook is on Wednesdays or Thursdays during the noon or in the afternoon. The best days for a post on Instagram are Wednesdays, Thursdays or Fridays around two o'clock (York, 2018; Sailer, 2018). The timetable for the postings of this test is given on table 1.

TABLE 1: TIMETABLE OF POSTINGS OF CASE STUDY 1

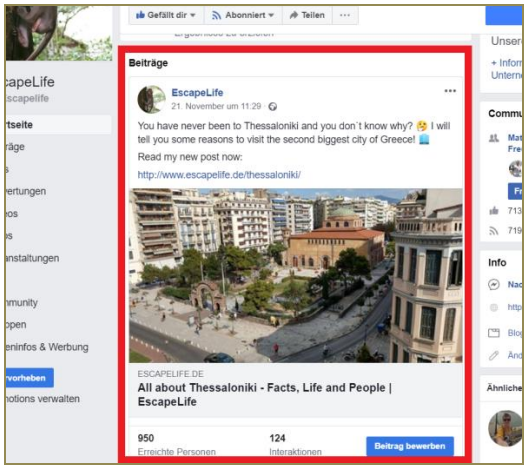
Timetable Postings				
Social Media Channel	**Day 1**	**Time**	**Day 2**	**Time**
Facebook (business page of the blog)	Wednesday (21.11.)	12:00 PM	Thursday (29.11)	3:00 PM
Instagram	Wednesday (21.11.)	1:00 PM	Thursday (29.11)	4:00 PM
Facebook (my private page)	Wednesday (21.11.)	2:00 PM	Thursday (29.11)	5:00 PM
Post in Facebook groups	Wednesday (21.11.)	3:00 PM	Thursday (29.11)	6:00 PM

The postings in the first week were almost published at the planned time. Some changes to the timetable were made in the second week due to the fact that the aim was to see what would happen after two weeks.

Additionally, a second post has been decided with the same content on the owner's Facebook (different Facebook groups) and Instagram pages.

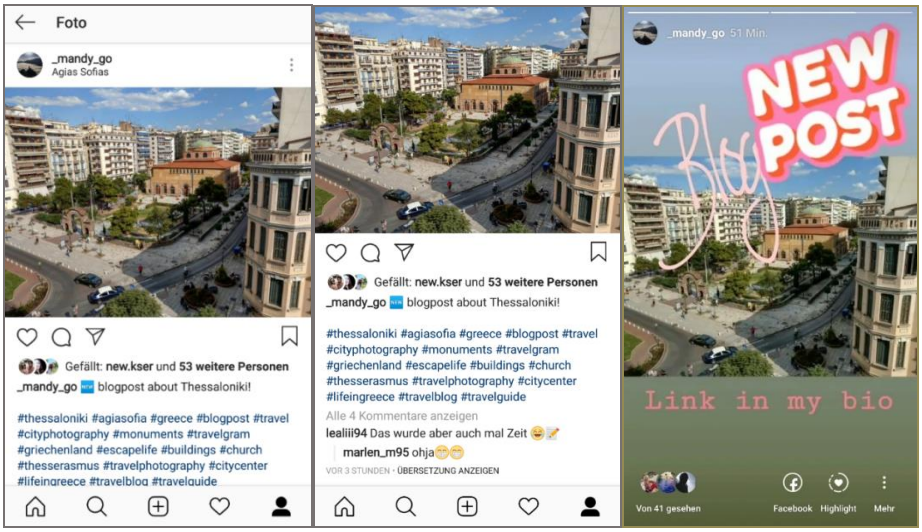
The post on the publisher's Facebook Business Page has been made using a short text, which should catch the readers' attention and provided a link to the blog post (Figure 2).

FIGURE 2: SCREENSHOT OF THE POSTING ON THE FACEBOOK BUSINESS PAGE



Regarding Instagram, the post was published in the publisher's feed and story (Figure 3). It must be noted that the disadvantage of a story is the limited time during which people can see the post.

FIGURE 3: POSTING IN INSTAGRAM FEED AND INSTAGRAM STORY



The post in the publisher' 'private Facebook and Facebook's groups' page was similar to the post in the business page.

4.1.3 Analysis of Case Study 1

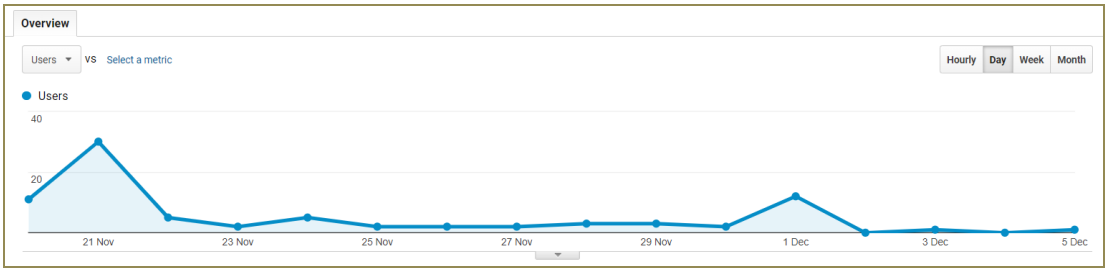
The analysis of the results clearly demonstrates the diffusion scale of social media postings. Using Google Analytics, it is possible to see the attendance of the blog's post during and after the promotion effect of Facebook and Instagram postings. Since the blog has not been active for several months, its traffic status before posting the blog post is clearly described. There have only been approximately 20 visits by the publisher herself, directly before the blog post was live due to maintenance procedures before the test.

As mentioned before, the article about Thessaloniki was online on the 21st of November at 12 o`clock. After this, real-time report started being collected. The real-time report can display the visitors of the blog in the moment a post is published in a social media channel. It shows the number of users on the blog at the current time. In the analysis that follows, the focus was not on the real-time report because Google Analytics offers a lot of opportunities to do very accurate analysis afterwards. Nevertheless, the real-time report was observed after the postings and this demonstrated that most people were visiting the blog after posts in Facebook. More specifically, half an hour after the posting on the private Facebook page some people visited the blog and especially the article about Thessaloniki. The real-time report

gave a direct insight into the current activities, but for a specific analysis the other areas of Google Analytics were found to be important. Therefore, the reasons for the different number of visitors will be explained below in more detail.

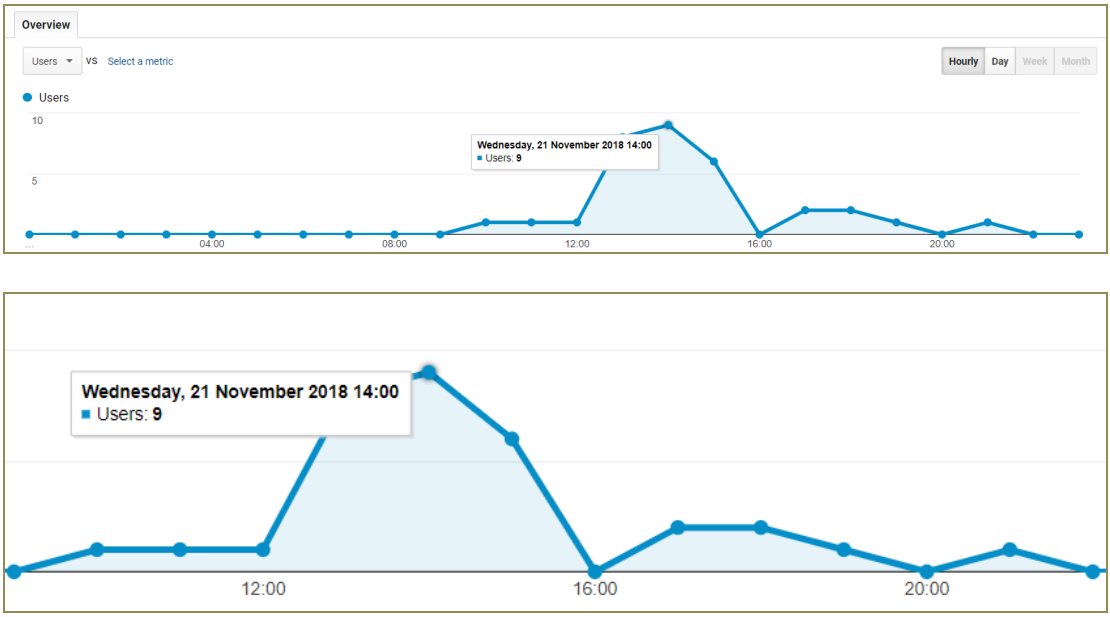
The analysis concerns the timeframe from the 20th of November to the 5th of December. According to that, the beginning is one day before the article went live and the end is one week after the last activity in a social media network. The audiences report gives information about the users, which are grouped together based on any combination of attributes, which are meaningful for the blog.

FIGURE 4: USERS ON MY WEBSITE FROM THE 20TH OF NOVEMBER UNTIL THE 5TH OF DECEMBER



Most of the visitors have read the blog post on the day it was published (Figure 4). There is a peak on the 21st of November. The peak on the 1st of December was probably not caused by a big number of visitors because just two users came from a social network to the blog. There has been no significant increase of users one week after the first postings, on the day of presenting the article in other Facebook groups. Possible reasons will be explained later, when the Facebook insights will be introduced. At first, a closer look at the day of publication is presented in Figure 5.

FIGURE 5: VISITORS OF THE BLOG AT THE DAY THE BLOG POST WAS PUBLISHED



After the article was published – at 12 o'clock – just 1 user visited the blog. After this first activity, half an hour after publishing the blog post, 8 visitors were on the blog. Since friends and followers on Instagram saw the posting – at 1:30 p.m. – more users visited the blog (Figure 5). When the Facebook post was shared on the publisher's private page there was a small decrease of users, which continued with the posting in Facebook groups. But in the evening some new or returning[1] visitors interacted with the blog.

With Google Analytics it is possible to confirm that most of the users visited the blog led by social media channels (Table 3).

TABLE 2: CHANNELS USED TO VISIT THE BLOG ON THE 21ST OF NOVEMBER

Default Channel Grouping	Acquisition		
	Users	New Users	Sessions
	30 % of Total: 100.00% (30)	29 % of Total: 100.00% (29)	31 % of Total: 100.00% (31)
1. Social	**23** (76.67%)	23 (79.31%)	24 (77.42%)
2. Direct	**6** (20.00%)	5 (17.24%)	6 (19.35%)
3. Organic Search	**1** (3.33%)	1 (3.45%)	1 (3.23%)

Table 3a shows that 23 out of 30 people visited the blog via a social network, 6 people searched directly for the URL of the blog or blog post and 1 person searched for it via a search engine.

TABLE 3: SOCIAL NETWORKS USED TO VISIT MY WEBSITE ON THE 21ST OF NOVEMBER

(a)

Default Channel Grouping	Acquisition		
	Users	New Users	Sessions
	30 % of Total: 100.00% (30)	29 % of Total: 100.00% (29)	31 % of Total: 100.00% (31)
1. Social	**23** (76.67%)	23 (79.31%)	24 (77.42%)
2. Direct	**6** (20.00%)	5 (17.24%)	6 (19.35%)
3. Organic Search	**1** (3.33%)	1 (3.45%)	1 (3.23%)

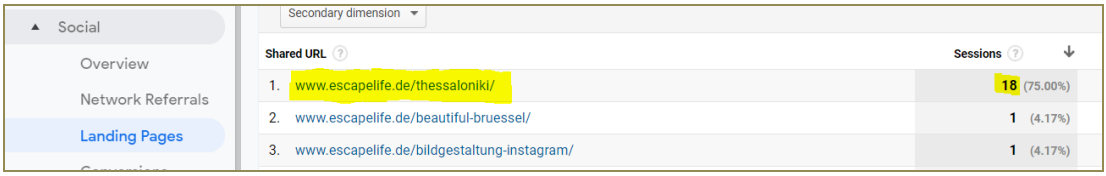
(b)

Social Network	Acquisition		
	Users	New Users	Sessions
	23 % of Total: 76.67% (30)	23 % of Total: 79.31% (29)	24 % of Total: 77.42% (31)
1. Facebook	**17** (73.91%)	17 (73.91%)	17 (70.83%)
2. Instagram	**6** (26.09%)	6 (26.09%)	7 (29.17%)

The second picture (Table 3b) clarifies what the specific social networks were, which were used by the visitors to get to the blog. With almost 75% of these users, Facebook dominated the traffic to the blog. One reason could be the more frequent use of Facebook by using the business page, the private page and the groups in Facebook. Moreover, it is easier to include a clickable link in a Facebook post than in Instagram. The last-mentioned network offers only the possibility to post a link in the biography and not in the post itself. Therefore, it is more difficult and elaborate for the user to get to the blog post. The reader must be really interested in the topic or the blog itself, so that he will go to the biography to find the link to the article.

Another indication that the social media users clicked on the link in the posts, is shown in table 4.

TABLE 4: MOST OF THE USERS, WHO USED A SOCIAL NETWORK FOR VISITING THE WEBSITE ON THE 21ST OF NOVEMBER, LOOKED AT THE ARTICLE ABOUT THESSALONIKI



The previous analysis showed that (free) promotion of a blog post can achieve positive effects on the same day that the article was published. But the long-term effects are even more important.

TABLE 5: (A) USED CHANNELS DURING THE TIMEFRAME 21TH OF NOVEMBER - 5TH OF DECEMBER
(B) USED SOCIAL MEDIA NETWORKS DURING THE TIMEFRAME 21TH OF NOVEMBER - 5TH OF DECEMBER

	Default Channel Grouping	Acquisition		
		Users	New Users	Sessions
		79 % of Total: 100.00% (79)	77 % of Total: 100.00% (77)	82 % of Total: 100.00% (82)
	1. Social	45 (56.96%)	45 (58.44%)	47 (57.32%)
	2. Referral	20 (25.32%)	20 (25.97%)	20 (24.39%)
	3. Direct	12 (15.19%)	10 (12.99%)	13 (15.85%)
	4. Organic Search	2 (2.53%)	2 (2.60%)	2 (2.44%)

(a)

	Social Network	Acquisition		
		Users	New Users	Sessions
		45 % of Total: 56.96% (79)	45 % of Total: 58.44% (77)	47 % of Total: 57.32% (82)
	1. Facebook	33 (73.33%)	33 (73.33%)	34 (72.34%)
	2. Instagram	12 (26.67%)	12 (26.67%)	13 (27.66%)

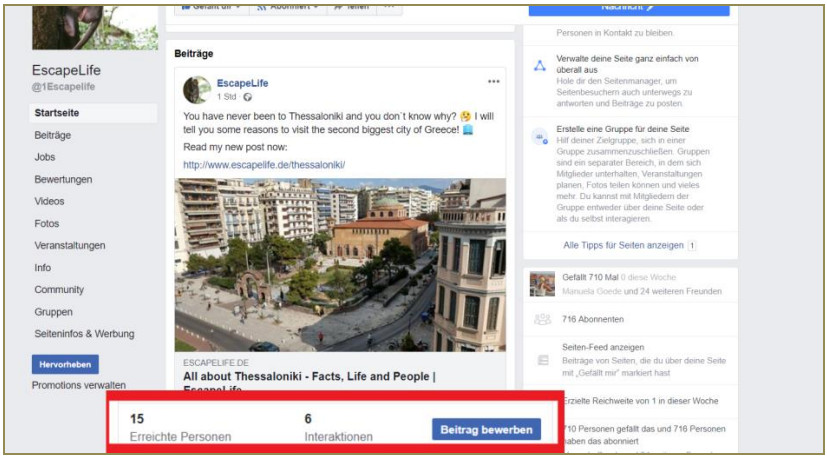
(b)

Even in the long-term view, social media is the most common channel to get to the blog (Table 5a). This demonstrates the positive effect of using social media for promoting the own blog. Referral traffic is the traffic which comes from other websites by using backlinks, for example. In this case it is not important to take a closer look at referral channels because the interest is based on social media channels. Furthermore, Facebook was used most frequently again (Table 5b). It was mentioned before that the main reasons might be the great number of using Facebook for the postings and the barriers on Instagram by implementing a link.

The analysis above has shown that just Facebook can reach a large number of traffic towards a website, especially a blog.

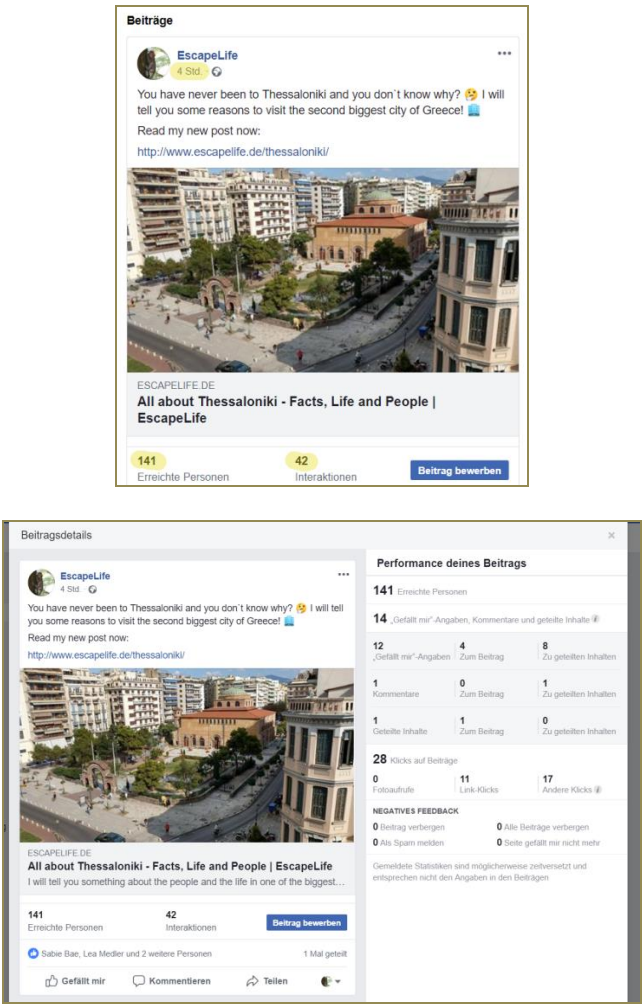
In addition to Google Analytics, Facebook Insights can help to analyze the interactions of users with the publisher's postings. The first post was on the publisher's Facebook business page. One hour later, this post has reached 15 people and caused six interactions (Figure 6).

FIGURE 6: REACHED PEOPLE AND INTERACTIONS ONE HOUR AFTER THE FIRST POST ON FACEBOOK



After three extra hours the post reached 141 persons and caused 42 interactions (Figure 7). One of the reasons might be the additional postings on Facebook and Instagram during this time. The Facebook Insights demonstrate the distribution of each interaction.

FIGURE 2: (A) REACHED PEOPLE AND INTERACTIONS THREE HOURS AFTER THE FIRST FACEBOOK POST
(B) FACEBOOK INSIGHTS FOUR HOURS AFTER POSTING - IN GERMAN



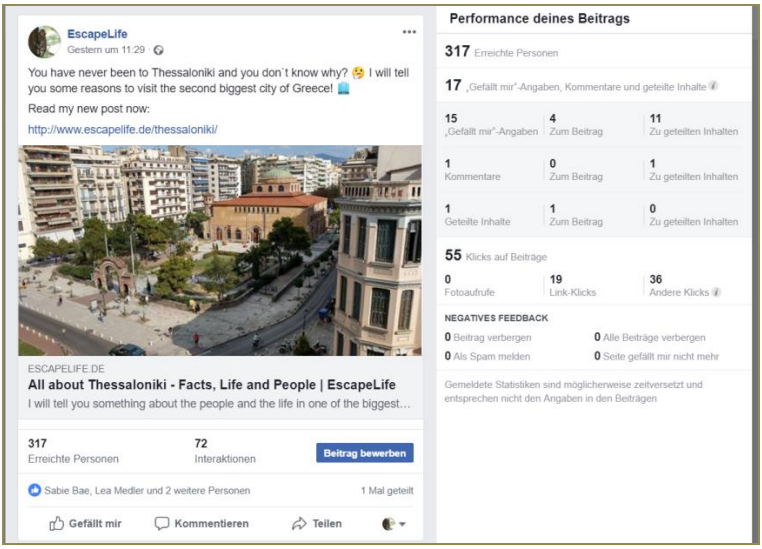
(a) **(b)**

14 of the 42 interactions were likes, comments or shared content. The shared content was the shared post on the blog. No one else shared it. 4 of those 14 interactions were “likes” for the post on the business page and eight of them were likes for a shared content that is the shared post on the publisher’s Facebook page.

One of those interactions was a comment. 28 of the 42 interactions were clicks, 11 clicks on the link in the description and 17 clicks on something else, probably on the picture (Figure 7b).

After one day this post reached more than double the number of people and caused almost double the amount of interactions (Figure 8).

FIGURE 8: FACEBOOK INSIGHTS ONE DAY AFTER THE FIRST POST ON FACEBOOK



These results suggest that most of the traffic generated by Facebook came from the post on the business and the private page. However, every post had a supporting effect, even the posts in the Facebook groups.

The postings in the Facebook groups were the only activities, which were repeated after one week. This repetition was possible because the choice of groups was different in each week. Probably, most of the readers didn't see the post before, except for the case they were members of more than one of the chosen groups. The selection of the groups was dependent on the topics. Since the article was about Thessaloniki, groups on the topics of travel and Greece have been selected:

Groups for week one, the 21st of November:

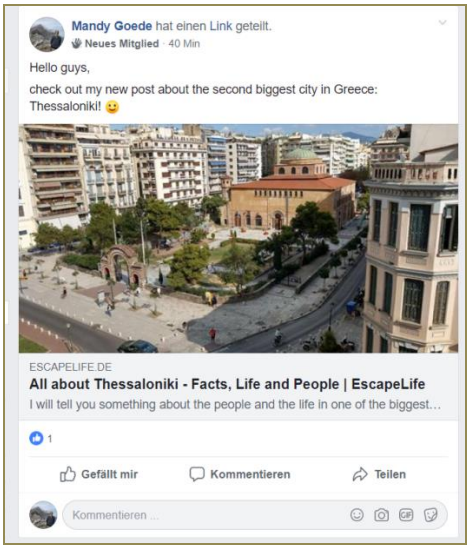
- Travel Bloggers
- Share Your Travel Blog/Posts
- Travel to Greece

Groups for week two, the 28th of November:

- Travel to GREECE
- Lovely Greece
- Ultimate Travel Group (UTG)
- Girls Who Travel
- Travel Meet Ups – The Solo Female Traveler Network
- Mietz's Crossroad for Travellovers <3

On the first day, after the four postings on Facebook and Instagram, only one person liked the post in the group "Travel to Greece" (Figure 9).

FIGURE 9: POST IN A FACEBOOK GROUP FOUR HOURS AFTER THE FIRST FACEBOOK POST



On the first sight the postings in groups seem to be irrelevant and unnecessary. But a closer look shows that these postings could be very useful. In the second week, when this post was published in other groups, the increase of reached persons and interactions was considerable. Before the new postings were published, 418 people saw the post on Facebook and 86 people interacted with this post (Figure 10). One hour after promoting the blog post with the aid of Facebook groups, almost 500 people were reached and over 100 people showed interactions with this posting (Figure 11).

FIGURE 10: FACEBOOK INSIGHTS AFTER ONE WEEK, ON THE 28TH OF NOVEMBER, BEFORE REPEATED POSTINGS IN FACEBOOK GROUPS

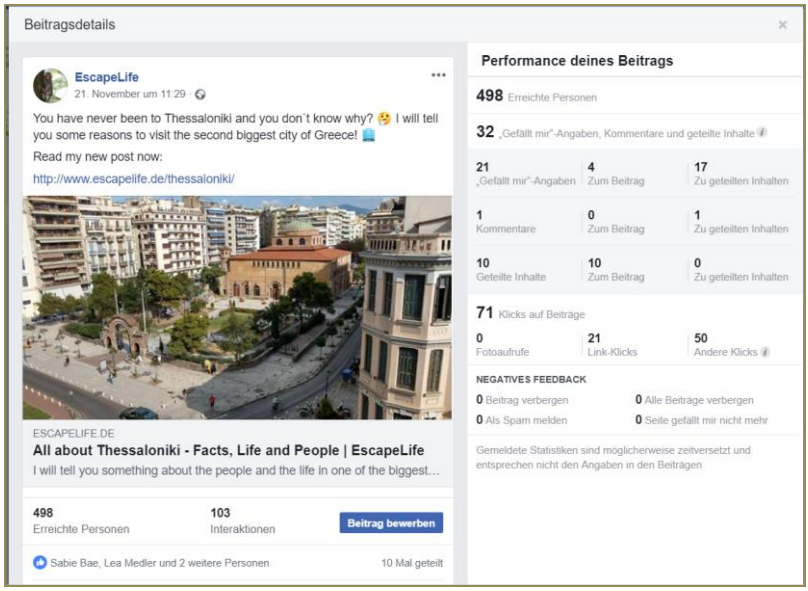
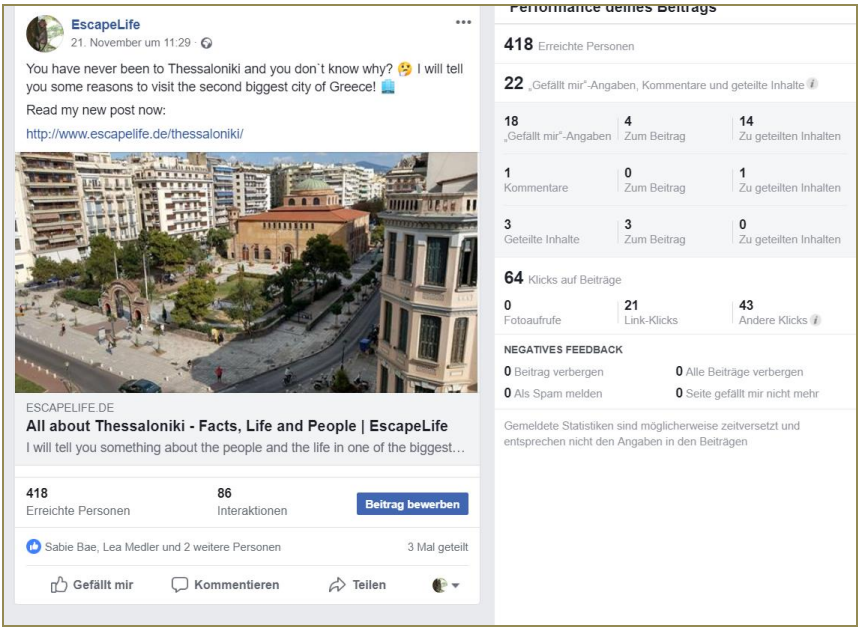


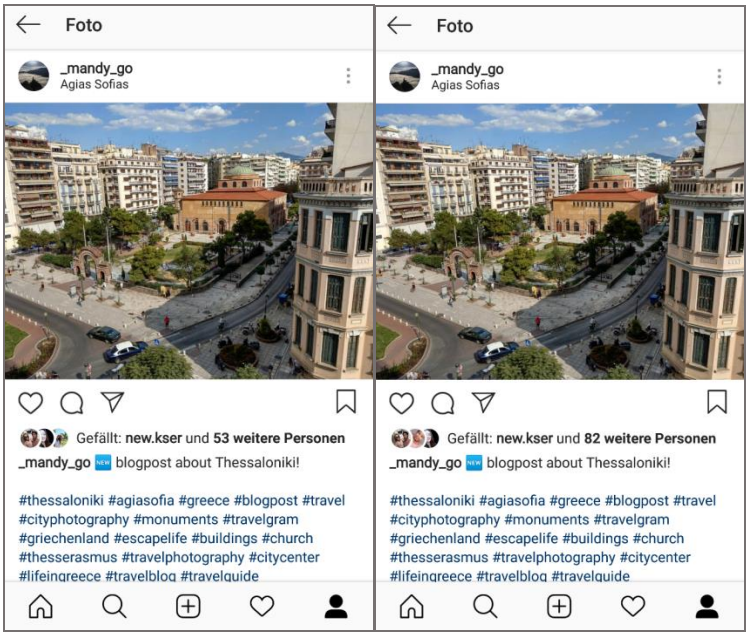
FIGURE 11: FACEBOOK INSIGHTS AFTER ONE WEEK, ON THE 28TH OF NOVEMBER ONE HOUR AFTER REPEATED POSTING IN FACEBOOK GROUPS



After two weeks, on the 5th of December, more than 900 people saw the posting and 124 persons liked, commented or shared the post or clicked on a link inside the posting. This demonstrates that the use of Facebook groups has also been important for a long-term effect. People seem to search for interesting content in groups with topics, they are interested in. But this positive effect will not exist forever because other people will post something into the groups too, so that older postings will not be read anymore.

Finally, although Facebook seemed to have the greater impact on the traffic towards the blog, the Instagram post also reached some people. On the first day 94 people saw the posting in the Instagram story and 54 liked the posting in the Instagram feed. After one day 77 users had already liked the posting and after one week 83 persons interacted with it (Figure 12).

FIGURE 12: INSTAGRAM FEED AFTER FOUR HOURS (A) AND AFTER ONE WEEK (B)



(a) **(b)**

It must be said that Instagram is a platform where people interact by sharing pictures, but also by liking pictures of others. In this case, no likes or comments to other posts have been made by the publisher for the first few days, so that the results would be more explicit. More interactions could probably be reached referring to the testing post by interacting with other postings, especially of a similar topic like Thessaloniki, travelling or Greece (Romero-Hall, 2017). For upcoming posts, it would be more useful to have an Instagram Business Account to use the Instagram Insights. The analysis would be similar to the analysis of Facebook Insights and would be consequently more detailed.

4.2 Case study 2
4.2.1 Content of the Post

In the second case study, a post in a personal blog in WordPress.com has been published where the second publisher shared her personal experiences after a student exchange period under Erasmus Plus student mobility program. The text of this article is given in Post 1.

POST 1: THE BLOG POST ENTITLED "THE NINE THINGS ERASMUS+ EXPERIENCES TAUGHT ME"

First of all, I have to mention that you can skip the introduction part if you are just curious about the nine things I have learnt on my Erasmus+ experiences.

"WHAT ARE YOUR PLANS FOR THE FUTURE?" This question drives me crazy. It started from the last year in high school and since then it is like an echo in my mind. This is the question I have always avoided because I am not the person who has dreamed of something for sure from the early adolescence. Answering the question would have meant to lie because I have never known or even imagined myself as an undergraduate student in a wonderful city just in the heart of Romania. Do you think I have ever wondered about being an Erasmus+ student in Denmark? What about being an Erasmus+ student twice?, because just right now I am in Greece, spending the whole semester here.
To sum up what I have related above, I will simply say that spontaneity (and not the certainty) is what gives me the most excitement, pleasure, joy and happiness. And this is the first thing I have learnt from my both Erasmus+ experiences.

Here are the **nine things** I have promised to share with you from the very beginning:

1. Do not be afraid of the future. Look at the uncertainty as to the chance to be spontaneous. The things happening spontaneously are not endangered by the risk of unrealistic expectations. That is why they are the most outstanding!
2. Clear the mind before moving abroad. Let the prejudices home.
3. Do not judge by appearances.
4. Think different. If you do not feel like sharing the most people's opinion, the crowd might be the wrong "place" to belong to.
5. Enjoy every single moment happening to you. Even if some moments can be experienced again, the way you felt in that certain moment is unrepeatable and irreplaceable.
6. Travelling cheap is possible. You just have to find the smartest ways to do it (according to your destinations).
7. Saving money is not a matter of the impossible. It is the result of...
8. Being temperate, well-balanced, responsible, conscientious and, of course, motivated.
9. Discovering and rediscovering myself, due to living in two opposite poles of Europe. I had no idea that I could like running through the rain or that the best medicine for my headaches is the view of sea reflecting the sunset. The only way to discover myself is knowing what brings me happiness (or sadness).

Do you have something to add? Please, share your opinion in the comment section.

I promise to update the post, as my second Erasmus+ experience is in full swing.

The post was in textual format and did not include any photos or other multimedia content, in order to investigate the reach of this kind of less attractive textual content as well.

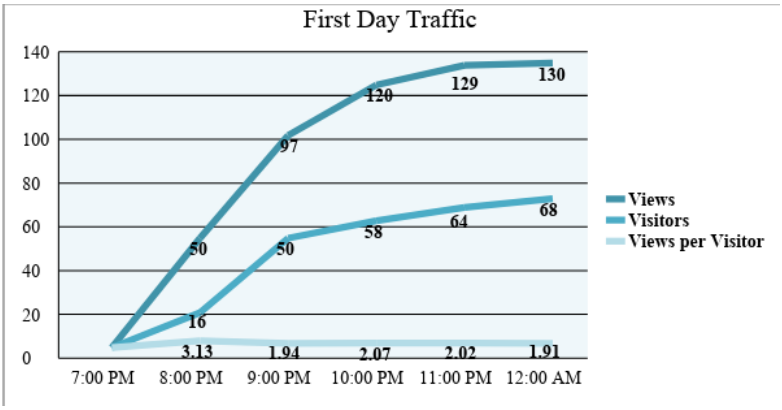
4.2.2. Selection of Social Media platforms

As in case study 1, the publisher used Facebook and Instagram feed and story to announce publicly the new blog post. Additionally, an account of mix.com has been used to promote the article as well as an account of Reddit. Finally, the online community Erasmusu.com, Facebook messenger and Viber groups have also been used to disseminate information about the article.

4.2.3 Analysis of Case Study 2

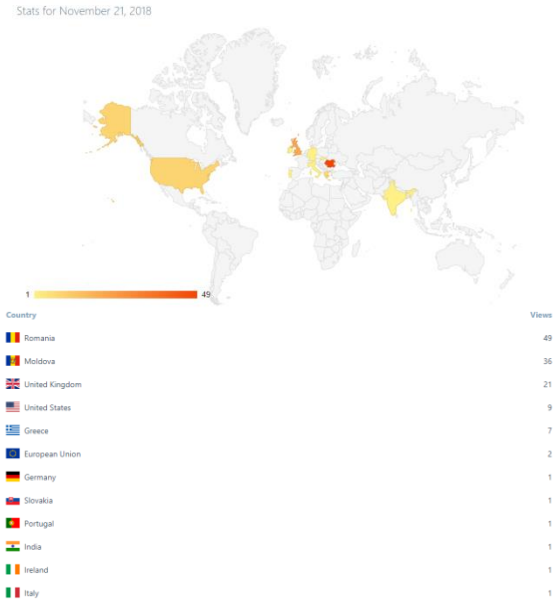
The statistics of the post have been acquired by the Wordpress internal data: blog traffic including views, visitors, views per visitor, visited posts and pages, countries and referrers. The post was published it on Wednesday, 21st of November, at 19:00. According to the previous blogger's experience and the literature, this has been considered to be the best diffusion time of the day for postings (Sailer, 2018). In Figure 13, the results acquired in the first day are appearing.

FIGURE 13: TRAFFIC RESULTS OF THE FIRST DAY OF POSTING



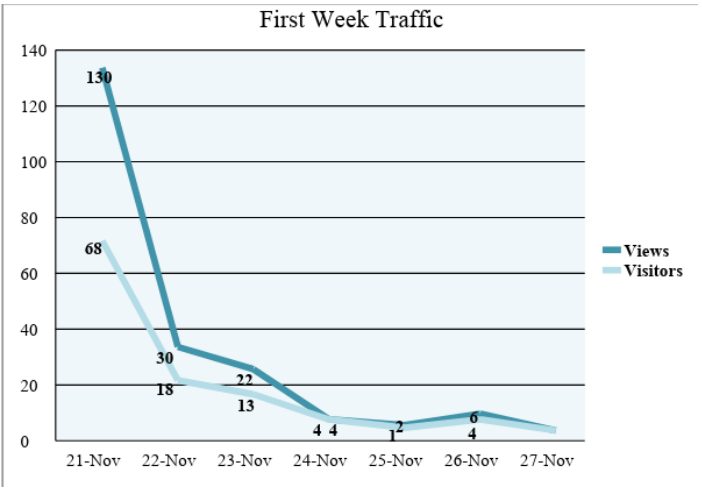
From the total number of 68 visitors, 56 of them accessed the link from Facebook and 11 of them from Instagram. People from 12 countries visited the blog, as given in Figure 14.

FIGURE 14: TRAFFIC ORIGIN OF THE BLOG POST



People continued visiting the blog during the first 6 days after promoting the article on Social Media. Figure 14 demonstrates the relevant traffic.

FIGURE 15: TRAFFIC OF THE FIRST 6 DAYS AFTER THE BLOG POSTING



During the first week, 102 people visited the blog. The post had 188 views and an average of 1.84 views per visitor. To those 12 countries one more has been added: France.

As described in the technical implementation section, the second publisher also used the Blogger.com blog-publishing service. This time she used some different promotion methods and some other tools to measure the website impact. After inserting the Google Analytics tracking code into the blog and also by connecting the SE Ranking account to Analytics, the next step would be to invite people to read the article and thus, collect the data. In an attempt to make the blog popular, the publisher created an account on Mix.com, a platform of sharing content, and linked the blog post to the description. The second step was to join Reddit community. The publisher found a *subreddit* called *Erasmus.* The article has been shared there and two post comments have been made in order for other students to know that they can find interesting information there. Another promotion method that has been used was to submit a message to Erasmus Student Network official website (esn.org), providing a blog hyperlink there as well. The publisher also created an account on Erasmusu.com, an online community for international students, and added there the written text about the blog post. Finally, a hyperlink to some Facebook Messenger accounts as well as to some Viber groups has been sent.

The first effects started to appear on the first day. The corresponding results are given in Figures 16, 17 and 18.

FIGURE 16: TRAFFIC OF THE FIRST DAY OF THE POST IN BLOGGER.COM SERVICE

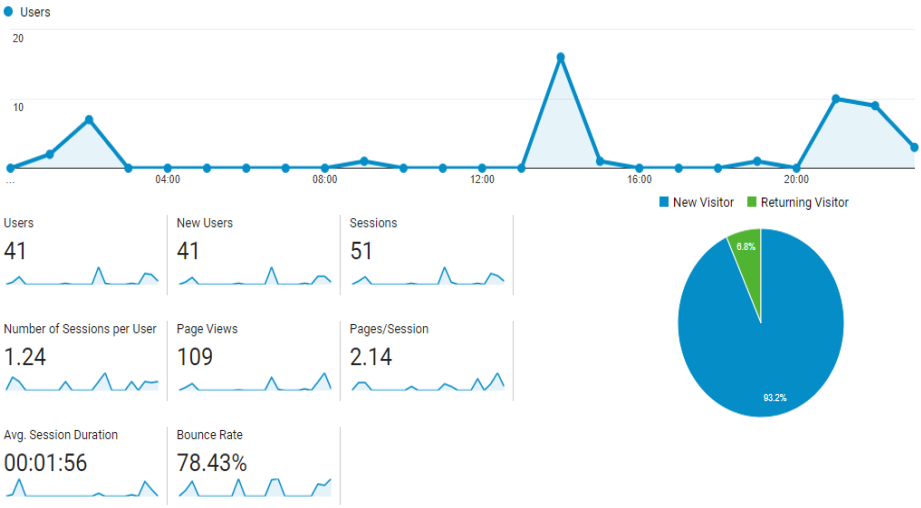


FIGURE 17: TRAFFIC OF THE FIRST DAY OF THE POST IN BLOGGER.COM SERVICE

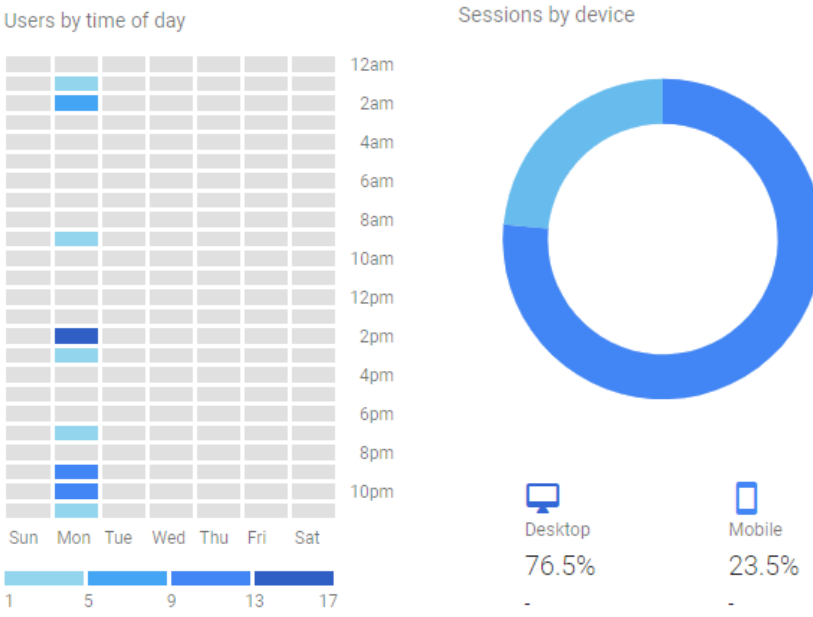


FIGURE 18: TRAFFIC OF THE FIRST DAY OF THE POST IN BLOGGER.COM SERVICE

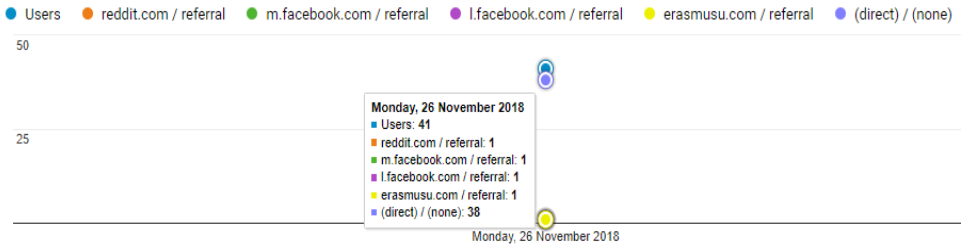
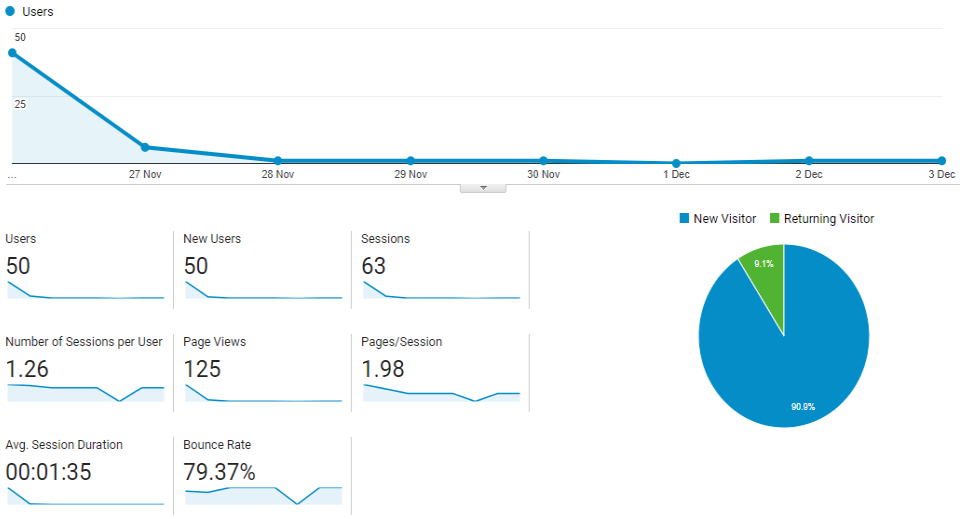


Figure 18 shows that 38 out of 41 users directly accessed the link, which means that the e-mail message worked the best. But there is no traffic from Mix.com, so this platform proved to have the weakest effect on the blog post diffusion.

During a **week** the numbers increased from 41 users to 50 and from 51 sessions to 63 (Figure 19). At this point, one more country has been added to the list: Italy.

FIGURE 19: TRAFFIC OF THE FIRST WEEK OF THE POST IN BLOGGER.COM SERVICE



According to the SE Ranking analysis, one was found to be really effective for raising the blog post reach: the **website audit**, which is very important for making the site more search-engine-friendly (Davidson 2013, p. 22). Apart from this, according to SE Ranking weekly reports, the blog post did not have an impact in order for its rank to be improved. This can be the result of lack of the keywords selected (only two keywords have been used: *Erasmus* and *travel*). Davidson (2013) recommends using some tools like e.g. Google AdWords in order to select the proper keywords.

5. DISCUSSION

All in all, both Facebook and Instagram appeared to have an impact on the visibility and publicity of the blog post. The analyses showed that they can both increase the number of visitors on the blog. There is only a difference between the opportunities each network offers and between short-term and long-term effects: it depends on the topic of interest of the blog and the time between two successive blog posts. If a person wants to create new articles every day or every second day (frequently enough!) it is possible to promote each article via Instagram. The person can use both the story function in Instagram and the feed because people will react to these promotions before the next article will be published. These functions also implicate a good short-time effect for bloggers who post new content less frequently. For the blog of case study 1, it was more important to have a long-term effect as, due

to its nature, postings of new content do not occur relatively frequently. In order to get interactions from the followers some days after the blog post goes online, it seems that is better to use Facebook. Figure 20 demonstrates that Facebook created more traffic in the days after the publication than Instagram (Figure 21).

FIGURE 3: NUMBER OF USERS WHO VISITED
THE WEBSITE VIA FACEBOOK

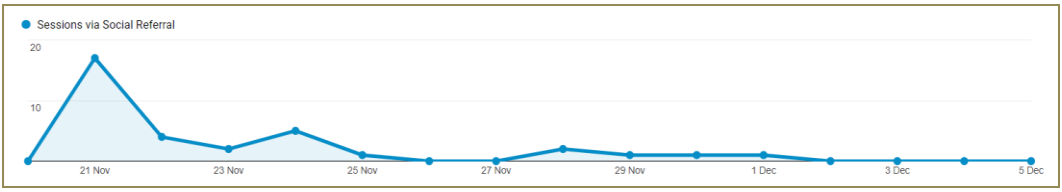
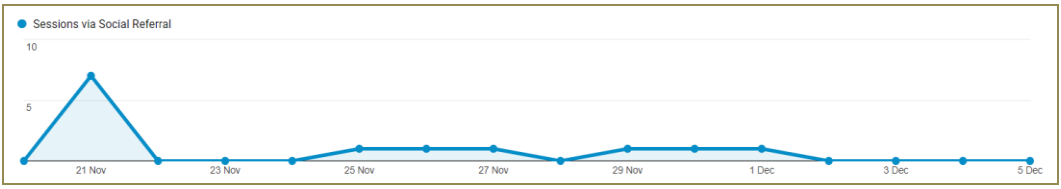


FIGURE 21: NUMBER OF USERS WHO VISITED
THE WEBSITE VIA INSTAGRAM



Even when the Facebook Insights showed that the postings in Facebook groups have a positive effect in the second week, the traffic of the blog of case study 1 didn't increase. However, the advantage of a Facebook group posting remains that it can extend visibility of the blog beyond its own followers.

It is also important to mention that the whole process highlighted the main social networks' principles of the social networking sites that were selected for the test. Interaction with other people in these networks is absolutely necessary for an effective promotion. It is not enough to post an article and just promote it in different channels. Other bloggers, influencers and all kinds of single users have the ability to boost content diffusion as well. But in order to achieve this, it is always good to comment and interact with the postings of these people (Balali et al., 2013), so that they will mutually interact with your own postings. This will increase the visibility, the popularity and in this way the traffic on the website (Curran, 2015).

While social networks continue to grow and attract more users every year, the proportion of commercial entities in these networks increases as well (Sihi and Lawson, 2018). Therefore, the number of paid advertisements rises. More and more firms try to sell their products via the social networks. They pay a lot of money to

increase the publicity and popularity of a post, so that more people see it and will buy the product (Stelzner, 2015). Simple users do the same. Bloggers that want to gain some popularity buy followers or spend money to highlight a posting. Nowadays it is almost impossible to get publicity without money in the social networks. Hence, it is obvious that the results of the test would be much different if money would be spent so that postings would have a greater reach to people and consequently more users would visit the blog.

Another important aspect is the actuality of the topic of the article (Lee, 2012). For example, if the article was about the latest political themes and would be shared through Facebook and Instagram with fitting hashtags, many people would visit the blog to read it. But, it is also important that the content of the article would belong to the broader thematic area of the website.

Generally speaking, the most interested users in a blogger's story are his/her closest actual social connections, therefore family and friends. Some of them will read them and in the best case scenario they will share them (Kumar et al., 2016). Based on this, posting promotion via Facebook page proved to be quite effective, as the closest connections of one's social network will be the first nodes that will further diffuse content to their networks according to their personal taste and choices (Susarla et al., 2011) and exploiting all weak ties paths. Through this procedure, the content will unavoidably reach the right people (Bakshy et al., 2012), in other words the influencers who will more effectively disseminate the content to their networks.

There are a lot of other factors, which can affect the popularity and publicity of a posting like brand awareness, niche topic or style of expression (McClure, 2011). These three seem to be the most important factors, which can be easily followed by everyone.

According to the literature, other factors are the increase of the Search Engines visibility (Davidson, 2013), interlinking with other blogs (a technique within the context of Search Engine Optimization), appropriate use of tags, frequent blog posting, functionality and aesthetics of the blog itself.

6. CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH

The analysis of the two test experiments demonstrated the interconnection between the Social Networks in what has to do with dissemination of blog postings and content. There are platforms that due to their higher degree of popularity and reach can be used to promote blog content dissemination more effectively while others can contribute to a lower degree. Facebook and Instagram tend to achieve better results at the time of writing, given that reasonable choices have been made to promote messages according to the topic of interest match over the appropriate communities and groups. Successive postings seem to attain better results but the time interval between them has to be carefully determined (Sailer, 2018). Blog interlinking

and bloggers' mutual recognition and interactivity, the oldest way to promote blog content, is a factor that will always have to be kept in mind (Vagianos, 2013).

Google Analytics is a comprehensive and versatile analysis tool that can help to perform tests over digital content diffusion monitoring over social networks. In this paper, the analysis of the most important effects of social media networks over blog posts, included only a small part of the whole analyses that Google Analytics can provide.

In similar future investigations, it would be also useful to include Big Data Analysis, taking under considerations the characteristic of the messages and content, the users, the communities and groups (Lagnier, 2013). With this approach, multiple tests like the ones presented here can lead to tailoring precise strategies for promoting blog content with the aid of Social Networking Sites, properly adjusted to the topic of interest of the topic itself, the target group, the appropriate way to involve the influencers of each case and the proper posting times and intervals.

The appearance of a blog or a blog post itself always plays a pivotal role (Patel, 2010), always adjusted to the screens of the devices of the targeted users. Google Analytics offers analyses for this potential.

There have been more than 15 years since the introduction of the first blogs and the formation of the Blogosphere. In the meanwhile, tons of recent and richer Social Media platforms have entered the world of Social Media. Their popularity varies from the time they are introduced to the time they are sometimes abandoned by public users. After all this time, blogs have managed to maintain high popularity, mainly due to their simplicity of use and ease of access. Digital content dissemination research and model development is expected to be kept within the academic areas of interest of the years to come.

NOTES

1. 6.5% were returning visitors at this day (these are 2 users)

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WEATHER ANALYSIS AND MONITORING USING SMART CAR AND INTERNET OF THING (IOT)

AMIRHOSSEIN ALAEIPOUR*

ABSTRACT

Traditional measurements and modeling that underpin present flood warning and alert systems are based on fixed and spatially restricted weather station and river (or groundwater) gauge networks. There are now significant volumes of open data and open-model systems available that can inform real-time response and guide emergency services and optimize their availability. In order to save lives and reduce damage to property and infrastructure from storms, heavy precipitation, waves and tropical cyclones as well as other hazards influenced by weather, like floods or dispersion of atmospheric or marine pollution, we need a smart monitoring, alert and an optimum modeling system. In this research, I will review Weather Analysis and Monitoring using Smart Car and Internet of Thing.

Keywords: *Weather Analysis; Monitoring; Smart Systems; Internet of Thing.*

1. INTRODUCTION

Weather condition plays a very important role in our daily life. Collecting data about different parameters of the weather is necessary for planning at home and environment. Recent developments in Internet of Things made it possible to collect the necessary data. An automated weather station is a device that is used to measure and record the known parameters of the atmosphere without involvement of humans. Weather conditions are required to be monitored to maintain healthy growth in crops and to ensure safe working environment in industries, etc. Due to technological development, the process of reading environmental parameters became easier compared to the past days. Sensors are miniaturized electronic devices used to measure physical and environmental parameters. By using sensors for monitoring weather conditions, the results will be accurate and the entire system will be faster and less power consuming. In any industry during certain hazards, it is very essential to monitor weather (Satyanarayana et al., 2016). In present days, as the technology improves day by day, everyone seems to automate most of the possible things to take advantage in providing ease in life. Weather changes occur in continuous motion in troposphere of the atmosphere, which is closest to earth of approximately 10

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kilometers in depth, which is below the stratosphere. By increasing in height, temperature is varied in different layers.

Present day innovations in technology mainly focus on controlling and monitoring of different devices wirelessly over the internet such that the internet acts as a medium for communication between all the devices. Most of this technology is focused on efficient monitoring and controlling of different devices. An efficient environmental monitoring system is required to monitor and assess the weather conditions in case of exceeding the prescribed level of parameters (e.g., noise, CO and radiation levels). The system proposed is an advanced solution for weather monitoring that uses IoT to make its real time data easily accessible over a very wide range (Yashaswi Rahut et al., 2018).

Nearly all the weather forecasts take place in the lower atmosphere. There are, various weather forecast techniques which are used with the help of human intervention. This problem can be overcome by using an automatic weather monitoring station. An automated weather station is an instrument that measures and records meteorological parameters using sensors without intervention of humans (G. Govardhan et al., 2016). Climate changes and weather conditions have been observed for centuries. Observing the weather parameter variations is essential to determine the environment changes. There had been always a huge importance of climate influencing human life which had motivated the development of whole scientific areas on the climate and weather observation. At the beginning there were simple and inaccurate instruments used, which were inadequate for easy reading and storing the measured parameters. Nowadays, there are many automated observatories and weather forecasting systems all over the world collecting the environmental parameters continuously for some applications which shows the importance of the weather on the day to day life. Apart from government and non-government organizations, the weather forecasted data can also be used in the fields like agriculture, transportation, construction etc. Apart from the scientific and commercial applications, weather forecasting systems can be used for educational purposes. The data of measured parameters are not useful if they are not transmitted in a fast and accurate manner to the users. Therefore, transmission and processing the measured data is a very important aspect of the modern weather forecast. Transmission of the measured data could be done by a number of means: WI-FI link, GSM/GPRS link, satellite link direct, wired link, etc. Weather forecasting has to be reliable and accurate, regardless of its application. Also, it has to provide simple access to all the measured parameters. The quality of sensors and precision of measurements may vary, and the location of the weather forecasting station can determine the accuracy and reliability of the weather data collection (K. VivekBabu et al., 2017). Monitoring weather and its forecasting have become a vital part of daily life because of its numerous applications in agriculture, farming, fishery, shipping and military operations. Measuring the weather using conventional or manually operated Weather Monitoring Stations

requires skilled labor for operation and demands regular maintenance, which invariably increases the life cycle cost of the Weather Monitoring Station (J. T. Devaraju, 2015). The smart city concept arises from the idea of efficient use of city resources for enhancing citizens' quality of life, as the pace of urban life has recently accelerated. To achieve a better quality of life, improvement of services and infrastructure in cities must be taken into account. There is going to be significant growth of connected devices, such as smart phones, tablets, and sensors. It has been predicted that by 2020, there will be more than 50 billion connected devices in the world. Most of common home IoT devices require little interaction and produce minimal data. Furthermore, some health care or factory automation sensors need or want to measure and send data to and from the Internet regularly. These are not massive consumers of bandwidth and can be called narrowband (NB) or ultra-narrowband (UNB) signals. Even if this saves both spectrum resources and power consumption, the drawback remain in the consequence of the IoT headway, the amount of devices and, thus, the amount of NB signaling as well as the significantly growing radio frequency (RF) noise. Thus, interference suppression (IS) is indispensable (Natthanan Promsuk et al., 2018). The Internet of Things (IoT) describes the interconnection of objects (or Things) for various purposes including identification, communication, sensing, and data collection. "Things" in this context range from traditional computing devices like Personal Computers (PC) to general household objects embedded with capabilities for sensing and/or communication through the use of technologies such as Radio Frequency Identification (RFID) (Edewede Oriwoh et al. 2013). Dark Sky is an open source Internet of Things (IoT) application and API to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network. The Raspberry Pi is a low cost, credit-card computer- sized that pads into a computer monitor or TV, and uses a standard keyboard and mouse. (Yashaswi Rahut et al., 2018). Other communication technologies like ZigBee RF Links can make the communication nearly in the same range of Wi-Fi but they can't broadcast the information as they can only communicate peer to peer. The World Wide Web (www) needs to have one client – server configuration for communication. Traditional technologies like home automation, wireless sensor networks and control systems work efficiently and smarter due to involvement of IoT. IoT has a wide range of application areas such as Medical applications where health of the patient can be monitored and the information is sent wirelessly (Satyanarayana et al., 2016). Awareness on the pollution free methodologies in the energy sector and the extreme support and motivation of public and private entities has given a scope for solar panels. Due to the technological advancement in solar panels systems, the market potentials have seen huge growth (Soumia Benlebna et al., 2018).

FIGURE 1.1: RASPBERRY PI

Source: Yashaswi Rahut et al. 2018

Event based Detection and Spatial Process Estimation are the two categories to which applications are classified. Initially the sensor devices are deployed in environment to detect the parameters (e.g., Temperature, Humidity, Pressure, LDR, noise, CO and radiation levels etc.) while the data acquisition, computation and controlling action (e.g., the variations in the noise and CO levels with respect to the quantified levels take place). Sensor devices are positioned at different locations to collect the data to forecast the behavior of a particular area of interest. A solution for monitoring temperature and CO levels i.e., any parameter value crossing its threshold value ranges, for example CO levels in air in a particular area exceeding the normal levels etc., in the atmosphere using wireless embedded computing system is proposed in this paper. The solution also provides an intelligent remote monitoring for a particular area of interest (Yashaswi Rahut et al., 2018).

1.1 Existing system

The existing weather monitoring systems generally use weather stations that use multiple instruments such as thermometers, barometers, wind vanes, rain gauge etc. to measure weather and climate changes. Most of these instruments use simple analog technology which is later physically recorded and stored in a data base. This

information is later sent to news reporting stations and radio stations where the weather report is given (Yashaswi Rahut et al., 2018).

1.2 Weather analysis and monitoring SYSTEM

The Weather Analysis and Monitoring system is an advanced solution for weather monitoring that uses IoT to make its real time data easily accessible over a very wide range. The system deals with monitoring weather and climate changes like,

1. Temperature, humidity by using the DHT11 sensor,
2. Wind speed using an Anemometer,
3. Light intensity using an LDR,
4. UV radiation using a GY8511 solar sensor,
5. Carbon monoxide levels in the air using MQ7,
6. Soil moisture using Hygrometer
7. Ultrasonic sensor for rain water level,
8. Raindrop sensor for detecting rainfall or snow fall (Yashaswi Rahut et al. 2018).

1.3 Feature and advantages of the system

1. 'Smart weather monitoring system' unlike conventional weather monitoring instruments is very small and compact allowing it to be installed easily on rooftops.

2. It is light and portable; this advantage allows us to easily carry it to remote location for installation. Due to its design it can be easily carried by a weather balloon to measure atmospheric changes at high altitudes.

3. The power requirements for our system (sensors and boards) is much less compared to the existing instruments in the market hence enabling us to use solar cells as power supply. This not only cuts down on cost but allows us to leave the monitoring system in remote areas where power is not easily available for long periods of time. Addition of solar panels also helps our design be eco-friendly.

4. The sensors used in product are much cheaper compared to the ones that are used in the existing weather monitoring systems making our design more cost effective.

5. These sensors send the data to a web page and the sensor data is plotted as graphical statistics. Unlike the existing system where data has to be physically transferred, the data uploaded to the web page can easily be accessible from anywhere in the world and they can also be used for future references.

6. Due to the presence of fewer moving parts, less amount of maintenance will be needed cutting down on maintenance charges.

7. The product even consists of an app that sends notifications as an effective alert system to warn people about sudden and drastic weather changes. This works as an efficient warning system for bad weather and storms.

8. For predicting more complex weather forecast that can't be done by sensors alone we use an API with the help of a Raspberry pi that analyses the data collected by the sensors and predicts an accurate outcome. This API can be used to access the data anywhere and at any time with relative ease and can also be used to store data for future use (Yashaswi Rahut et al., 2018).

1.4 System architecture

The implemented system consists of an Arduino Uno which is used as a main processing unit for the entire system and all the sensor and devices can be connected with the microcontroller. The sensors can be operated by the microcontroller to retrieve the data from them and it processes the analysis with the sensor data. The processed data can be uploaded and stored in a website to function as a data base using nodemcu and Ubidots (Yashaswi Rahut et al., 2018).

1.5 Arduino UNO

It is an open-source physical computing platform based on a simple micro-controller board, and a development environment for writing software for the board. Arduino can be used to develop interactive objects, taking inputs from a variety of switches and /or sensors, controlling a variety of lights, motors, and other physical outputs.

1. Microcontroller: Microchip ATmega328P
2. Operating Voltage: 5 Volt
3. Input Voltage: 7 to 20 Volts
4. Digital I/O Pins: 14 (of which 6 provide PWM output)
5. Analog Input Pins: 6
6. DC Current per I/O Pin: 20 mA
7. DC Current for 3.3V Pin: 50 mA
8. Flash Memory: 32 KB of which 0.5 KB used by bootloader
9. SRAM: 2 KB
10. EEPROM: 1 KB
11. Clock Speed: 16 MHz
12. Length: 68.6 mm
13. Width: 53.4 mm
14. Weight: 25 g (Yashaswi Rahut et al., 2018).

1.6 NodeMCU

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP12 module.

1. Type: single board microcontroller
2. Operating system: XTOS
3. CPU: ESP8266
4. Memory: 128 kbytes
5. Storage: 4Mbytes
6. Power: USB (Yashaswi Rahut et al., 2018).

1.7 LDR Light-Dependent Resistor

Light intensity is measured using an LDR. An LDR is a component that has a (variable) resistance that changes with the light intensity that falls upon it. This lets them to be used in light sensing circuits. A light dependent resistor (LDR) is a light-controlled inconstant resistor. The resistance of this decreases with increasing incident light intensity; in other words, it exhibits photoconductivity (Yashaswi Rahut et al., 2018).

1.8 CO Sensor

Carbon Monoxide (CO) sensor, suitable for sensing CO concentrations in the air. The MQ-7 can sense CO-gas concentrations anywhere from 20 to 2000ppm. This sensor has a high sensitivity and fast reaction time. The sensor's output is an analog resistance (Yashaswi Rahut et al., 2018).

1.9 ML8511

ML8511 module is an informal which uses an ultraviolet light sensor. The ML8511 Sensor works by outputting an analog signal in relation to the amount of detected UV light. This breakout can be very handy in creating devices that warn the user of sunburn or detect the UV index as it communicates to weather conditions.

1. Supply Voltage: DC 5V
2. Operating Temperature: -20~70°C
3. Sensitivity Region：UV-A and UV-B
4. Sensitivity Wave Length: 280-390nm
5. Module Size: 30 x 22mm (Yashaswi Rahut et al., 2018).

1.10 Anemometer

An anemometer is a device used for determining the speed of wind, and is also a common weather station instrument.

1. Style: three cups
2. Material: aluminum alloy
3. The mode of its output signal：0-5V (Voltage signal)
4. Supply voltage: DC 9-24V
5. Power consumption Voltage MAX≤0.3W
6. Start wind speed：0.4-0.8m/s
7. Resolution：0.1m/s
8. Effective wind speed measurement range：030m/s
9. System error：±3%
10. Transmission distance More than 1000m
11. Transmission medium Cable transmission
12. Connection mode three wire system
13. Working temperature：-40℃~80℃
14. Working humidity: 35%～85% (Yashaswi Rahut et al. 2018).

1.11 Android App

This product also consists of an app which is developed using the MIT app inventor. The main purpose of this app is to provide notifications on weather updates and to act as warning system in case of bad weather. The app will obtain the necessary information through the existing database (Yashaswi Rahut et al., 2018).

1.12 Implementation

The system can be implemented in a 4- tier model with the functions of each individual module developed for monitoring the different weather parameters. Tier 1 is the environment, sensor devices in tier 2, sensor data acquisition and decision making in tier 3 and warning notification in tier 4. Here, tier 1 provides information about the parameters under the region which is to be monitored. Tier 2 deals with the sensor devices with suitable characteristics, features and each of these sensor devices are operated and controlled based on their sensitivity as well as the range of sensing. In between tier 2 and tier 3 necessary sensing and controlling actions will be taken depending upon the conditions, like fixing the threshold value, periodicity of sensing, messages etc. Based on the data analysis performed in between tier 2 and tier 3 and also from previous experiences the parameter threshold values during critical situations or normal working conditions are determined. Tier 3 describes the data

acquisition from sensor devices and also includes decision making, which specifies the condition the data is representing each parameter. In the proposed model tier 4 deals with the intelligent environment. Which means it will identify the variations in the sensor data and fix the threshold value depending on the identified levels. In this tier sensed data will be processed, stored in the cloud and accordingly the notification will be sent.

Based on the framework we have identified a suitable implementation model that consists of different sensor devices and other modules. In this implementation model we use a NodeMCU for sensing and storing the data in cloud. Inbuilt ADC and Wi-Fi module attaches the embedded device to internet. Sensors are connected to NodeMCU board for monitoring, ADC will convert the corresponding sensor reading to its digital value and from that value the corresponding environmental parameter will be evaluated (Yashaswi Rahut et al. 2018).

1.13 Simulation results

After detecting the data from different sensor devices, which are positioned in particular area of interest, the sensed data will be automatically sent to the web server, when a proper connection is recognized with sever device. The web server page will allow us to monitor and control the system. By entering the IP address of the server which is placed for monitoring we will get the equivalent web page. The web page gives the information of the weather parameters in that particular region, where the embedded monitoring system is placed (Yashaswi Rahut et al., 2018).

1.2 Objectives of the paper

The system proposed is an advanced solution for weather monitoring that uses IoT to make its real time data easily accessible over a very wide range. The system deals with monitoring weather. Sensors send the data to the web page and the sensor data is plotted as graphical statistics. The data uploaded to the web page can easily be accessible from anywhere in the world. The data gathered in these web pages can also be used for future references. The project even consists of an app that sends notifications as an effective alert system to warn people about sudden and drastic weather changes. For predicting more complex weather forecast that can't be done by sensors alone, I use an API that analyses the data collected by the sensors and predicts an accurate outcome. This API can be used to access the data anywhere and at any time with relative ease and can also be used to store data for future use. Due to the compact design and fewer moving parts this design requires less maintenance. The components in this research don't consume much power and can even be powered by solar panels. Compared to other devices that are available in the market the Smart weather monitoring system is cheaper and cost effective. This research can be of great

use to meteorological departments, weather stations, aviation and marine industries and even the agricultural industry.

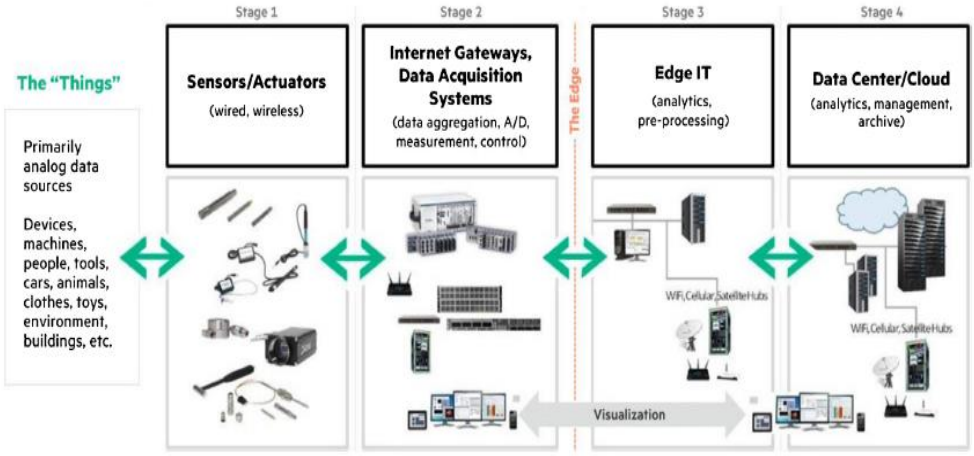
2. LITERATURE REVIEW

National meteorological services are continually working on improvements of their weather and warning information. Rangeland seeding practices in the Intermountain Western United States are predominantly implemented in the year immediately following wildfire for the purposes of Emergency Stabilization and Rehabilitation (ESR). This necessarily links restoration and rehabilitation outcomes to the probability of a single year, providing sufficiently favorable microclimatic conditions for desirable plant establishment. Field research studies in rangeland restoration are also typically of limited duration, and published results may not represent the full spectrum of conditions likely to be experienced at a given site (Corey A et al., 2018). Broadband technologies are credited for a lot of the widespread adoption of networking solutions in many real-life applications (Mohamed Younis, 2018). The cyber-physical convergence, the fast expansion of the Internet at its edge, and tighter interactions between human users and their personal mobile devices, push towards a data-centric Internet where the human user becomes more central than ever. We argue that this will profoundly impact primarily on the way data should be handled in the Next Generation Internet. It will require a radical change of the Internet data-management paradigm, from the current platform-centric to a human-centric model. To this end, IoP algorithms exploit quantitative models of the humans' individual and social behavior, from sociology, anthropology, psychology, economics, and physics. IoP is not a replacement of the current Internet networking infrastructure, but it exploits legacy Internet services as (reliable) primitives to achieve end-to-end connectivity on a global-scale (Marco Conti and Andrea Passarella, 2018). These embedded software systems are increasingly autonomous and connected, and can thus be modeled as multi-agent systems (MAS). Just 30 years ago, it was science fiction that over a billion people would exchange billions of e-mails on a daily basis. Today a scenario of millions of collaborating agents sometimes embedded in gadgets and appliances, sometimes in the form of networked and big data services, may also sound futuristic. Organization theory provides the necessary methodology to approach complex systems in order to design, implement and strategically manage them towards success (Markus Schatten et al., 2016). The spread of geolocated smartphones and the decreasing price of GPS devices have contributed towards the production of large amounts of data on human movement of unprecedented spatio-temporal quality (Vanessa, S. et al., 2018).

3. METHODOLOGY

Historically, Industrial Automation and Control Systems (IACS) were largely isolated from conventional digital networks such as enterprise ICT environments. Where connectivity was required, a zoned architecture was adopted, with firewalls and/or demilitarized zones used to protect the core control system components. The adoption and deployment of 'Internet of Things' (IoT) technologies are leading to architectural changes of IACS, including greater connectivity to industrial systems (Hugh Boyes et al., 2018).

FIGURE 3.1: A 4-STAGE IOT SOLUTIONS ARCHITECTURE

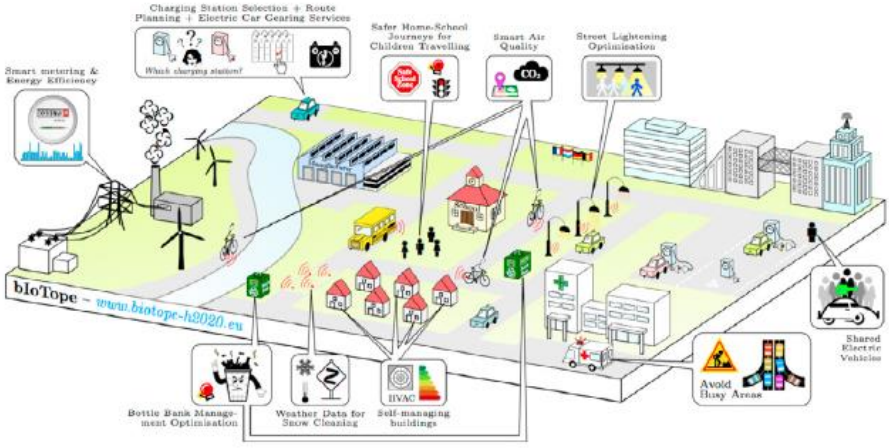


Source: Hugh Boyes et al., 2018

The proposed classification scheme is adapted from the above model (figure 3.1) but is extended to include wider enterprise IT in order to accommodate the convergence of information and operation technologies, and adjacencies. In the Thing class we have included a sub-class "Monitor' to accommodate devices that provide a wider functionality than measurements, e.g. A CTV camera (Hugh Boyes et al. 2018). While the Internet of Things is still seeking its own shape, its effects have already stated in making incredible strides as a universal solution media for the connected scenario. An architecture specific study has always paved the conformation of related field. The lack of overall architectural knowledge is presently resisting the researchers to get through the scope of Internet of Things centric approaches (P.P. Ray et al. 2018). A smart city infrastructure (Figure 3.2) hosts diverse applications of IoT systems. The elements of such a system might contain smart parking, smart traffic

lights, smart metering and similar smart vertical domain applications. That's why such a system might be composed of thousands of interconnected IoT enabled endpoints (Koray Incki and Ismail Ari, 2018).

FIGURE 3. 2: A LARGE-SCALE SMART CITY APPLICATION



Source: Koray Incki and Ismail Ari.2018

4. FINDINGS AND DISCUSSION

The Internet of Things provides an optimal combination of the processes, data and communications of people that are intelligently interconnected via the Internet. The IoT goal in the automotive sector is to optimize human-to-human, car-to-machine and human-to-machine interactions, which will improve the daily activities of the people. The current generation of cars consists of a lot of electronic recordings. In fact, cars have the highest density of electronic components among all consumer devices. Today, a wide range of technology is used in cars. These technologies are categorized into three different areas: 1. Safety and security; 2. Power transmission / fuel consumption; 3. Entertainment and telecommunications. All of these technologies are interconnected inside the machine and are centrally controlled. As a technology center, the car covers the Internet concept of objects in relation to people and processes in an integrated manner. In fact, by collecting, managing and analyzing data, a more complete concept of the Internet platform for objects and the Internet of cars can be achieved. The first voucher for car users is its security. Smart machines help secure each other. These cars can provide you with information about road and traffic conditions and other obstacles ahead. Smart sensors embedded in cars help to identify

vehicle environments, internet connectivity, and positioning. Today, telecom applications can conveniently contact emergency centers in case of accidents. Maintenance of vehicles, which is a pre-emptive way to ensure the safety of the car, has now significantly improved. Also, telecommunication applications offer anti-theft features, traceability and vehicle position reporting. On a macro scale, the Internet can provide traffic forecasting and traffic management through a communication network for vehicles, which can lead to safer roads and less traffic congestion. Connectivity decisions are the decisive factors in determining value proposition and the supporting business model for connected vehicle services. In the future, urban transportation is expected to be electric, autonomous, and on-demand. This is the vision that captures the major trends in mobility and is the one that companies like Uber and Google already appear to be working toward. Weather is the air condition in a certain place and in a relatively short time that includes conditions of temperature, humidity, and barometric pressure as its main component. Weather changes can be observed by using a device called Automatic Weather Station (AWS). AWS has been widely applied in various fields such as environmental research for geo-statistics, analysis of temperature measurement, prediction of wind energy potential location, measurement of the movement of the mass balance, and estimation of crop water needs. There are many kinds of AWS used for a monitoring system. One of them is the Wireless Vantage Pro 2 weather station by Davis Instrument. To display the data on a website or mobile devices, an additional module called Weather Link IP is needed. This module serves as a data logger to upload data from the console Vantage Pro directly to the website Weather link. AWS is a meteorological station to observe the weather and to send the results automatically. In AWS, measuring tools read or receive a data using the data acquisition device unit. The data from measurement devices can be processed locally at the AWS itself or processed in other places such as the central data processing unit. AWS can be designed in an integrated manner using a variety of measurement devices such as integration of instrument systems, interfaces and processing, and transmission unit called Automatic Weather Observing System (AWOS) or Automatic Surface Observing System (ASOS). Based on presentation of the data, AWS can be grouped into real-time AWS and off-line AWS. Real-time AWS is a weather system that presents data in real-time. In general, this AWS is equipped with communication and alarm system to alert the user in case of extreme weather conditions. A real time AWS features has the collection of data units, the data storage and the wireless data communications using GSM/GPRS module that has the capability for providing data communications in a wide range. Off-line AWS is a weather station that only records data and stores them on storage media. Stored data can be retrieved at any time as necessary. AWS has features with several sensors, including a thermometer for measuring the temperature, an anemometer for measuring wind speed and direction, a hygrometer for measuring humidity, a barometer for

measuring the air pressure, a rain gauge for measuring rainfall and pyrometer for measuring the solar radiation (Aris Munandar et al., 2017).

5. CONCLUSIONS

The main aim of this research is to design and implement a resourceful monitoring system through which the required parameters are monitored remotely using internet and the data gathered from the devices are stored in the cloud and to project the predictable trend on the web browser. The embedded system is an integration of sensor devices, and wireless communication which enables the user to remotely access the various parameters and store the data in cloud. To implement this, we need to deploy the sensor devices in the environment for collecting the data and analyse them. By deploying sensor devices in the environment it will record real time data. It can cooperate with other objects through the network. Then the collected data and analysis results will be available to the end user through the Wi-Fi. For further research, I will use Weather information in Smart Car navigation and transportation network companies.

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