

# IT Level in Post-Conflict Regions Modern Education, Paramount for Sustainable Economic Development

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**Abstract:- The technology enormously has changed the way humans live today. It is considered the base of civilization. After the life itself, it is the greatest gift of invention. It certainly plays important role in all life horizons. The most critical processes and complex ones are done efficiently with the help of technology. Life has changed for the better. It has revolutionized the education field as the most important one, born by it. The importance of technology in education is vital. After the arrival of computers in school, for teaching it has become easier to spread knowledge and more appreciated for learners. With the post-conflict countries, the situation shows deficiencies as a result of damages from recent conflicts. When the technological attention has not been received in modern education, they lack on technology use, development and sustainability as a country. Literature shows that, IT revolution countries face industrial revolution. Kosovo faces a lack of prosperity, that's because it is in a vital need of it. The results of poor performance in literature, draws a necessity for research to take an investigation in the education area, in all levels of education; primary, secondary and tertiary. The survey research has been conducted in person in schools and universities of Kosovo. The issues evidenced from the absence of IT knowledge and use in the education, in both public and private sectors, are interpreted in quantitative survey collection direct from students.**

**Keywords:-** IT, Modern Education, post-conflict, sustainable development.

## I. INTRODUCTION

From the most recent country profile in 2017, the Republic of Kosovo has these characteristics: Its territory stretches on over 10,908 km<sup>2</sup> inhabited by approximately 1.9 million people. The country is situated in South-East Europe, surrounded by Albania, Montenegro, Macedonia and Serbia (Kosovo Country Profile, 2017).

Kosovo is a subject of a complicated past, as a part of Serbia for over one century. After a conflict in 1999, Kosovo became administered during the transition from United Nations Mission in Kosovo (UNMIK). Gradually transferring into self-governance work, the country declared its independence in 2008. Today Kosovo is the newest country in Europe and out of 193 UN member states most of them has to recognize it (Kosovo Ministry of Foreign Affairs, 2017).

The shattered political system has brought a negative impact on the development agenda in the country (Belloni and Strazzari, 2014). The system followed the mentality of local ownership in the state-building process. The political elite increased their activities on the cost of public services and the

country is led by a strong autocracy (Bicaj & Berisha, 2013; Coelho, 2015). The economic historian Douglas North has foreseen Kosovo as a low-income developing country, with 'limited access social order' and lack in contribution to economic development and stabilization (Stapleton, 2010; North et al, 2007, p.3).

As an emerging country, Kosovo experiences a rigid transition from its tremendous past and volatile present system. For over two decades, developing countries are inflowing aids to help the country move from a post-war condition to a developing society, considering its mostly unemployed substandard population (World Bank, 2016; Kosovo Country Profile, 2017). The main goal of society, is to boot up the volatile economy that bears too many burdens.

While in developed countries there are many sources of renewable energy available, Kosovo's energy 98% is dependent on fossil fuel. This adds strain to environmental degradation on the economy and society. It makes air pollution an acute problem from carbon emission, resulting in more chronic illness and early deaths (Kammen, Mozafarei, and Prull, 2012, p.21; Health and Environment Alliance [Heal, 2017]).

Kosovo has a multitude of challenges, especially on the poor economic development. Rosacker (2010) argues that most weak business cases found in the literature were low productivity related (Rosacker, 2010). The main reason falls on financial capacity, and disaster management (Mubarak et al, 2005). Intrinsically, with such a poor economy, the country has a limited budget to mitigate the acute pollution problem and the effects of climate change, or manage human factors to implement any sustainable goal standard (EU commission, 2012).

Education problems include factors similar to the problems of economic development. Issues withing education in developing countries, typically relates with the finance and the lack of knowledge in technology, through missing skills and computer literacy (Ihesiene, 2014; Krasniqi, 2016; Krasniqi, 2010; Berisha, 2009; Soni & Veseli, 2011). The role of IT in economic development is crucial, since the element of success and growth of jobs and trade market, is allowing the information share and business in instant time (Tchamyou & Asongu, 2017; Caputo et al, 2018). Particularly in the developing countries, IT contributes to reducing production costs for business growth and advanced communication (Majeed, 2018).

The lack of technology adoption has minimised skills and computer literacy (UN Stapleton, 2010), that's why enterprises main concern with their performances and developments was focused on IT and innovative changes

(Berisha, 2009).

Kosovo as a post-conflict developing country, in order to preserve its magnification, should call for generating sustainability goals in many spheres of life including technology adoption. Although its government promised to build infrastructure in all areas for sustainable development, they did not report any strategy on economic restoration in long term (Prime, 2016).

Considering numerous issues mentioned above, the research aim is to find out the level of digitalization available in the post- conflict regions like Kosovo. Whether the digitalization available can provide necessary knowledge and practice. Assuming the better situation of investment in the private sector, is there a promising difference. In regards to higher education, what is the situation? Is there sufficient availability and use of IT, in school subjects and research?

Research foresees possible issues and challenges to conduct the survey. In order to do it online, in Kosovo many houses/students don't have computers and internet available, and potentially many that belong to the early school category don't know how to use it. To do the survey, the permission should be taken from schools and from all parents or guardians of young age. This situation can make the survey collection more time consuming and extra effort with people communication, since with the low context cultures challenges of communication are higher. The language of 95% of the people of Kosovo is Albanian. Challenges of understanding on lower levels are assumed, so the survey is done in Albanian. The pandemic has added extra challenge world-wide. The school time table this year most of the time was part-time. As such more days should be spent in schools in order to fulfill the time planned.

The contribution of this work is beneficial in several areas. Firstly, it is a rare work for post-conflict regions in IT education. It is a noble country information evidence for digitalization need in education. For the research area it is extra work of empiric research. For students of Kosovo more academic open access work, always with deficient literature available. For the university extra material from their student in the school library.

The organization of this paper is as follow. It starts with an introduction to the demographics and basics of the country chosen to represent post-conflict cases. Follow by the background that led to research objectives and hypotheses. Methods for design of the survey with collection and analysis on it. Interpretation of data and discussion for a clear understanding of the situation. The last chapter summarises the paper with significance, limitations and final conclusion.

## II. BACKGROUNDS

### A. *IT implementation, solution for modern sustainable education*

Sustainability in theory is a form of lasting society and economy on a global scale (Elzen, B., Geels, F. W., & Green, K. 2004). Sustainability with development SD, has grown in a well know theory and practice world-wide concept for dealing with transition and development problems. This

notion to be very complex was introduced in the last century. World Environment commission saw it as a concept of current development and need, without compromising the future generation's ability too. (Rap, P. K. 1999; World Commission on Environment and Development 1987). As per other countries interpretation for Kosovo, strictly have mentioned that education is the main pillar for SD in human capital and fortunate life (UNESCO, 2017). The importance of Education for Sustainable Development ESD, is the ability to work as a tool to launch development agenda in the education system in Kosovo. Besides assisting young people for success, relationships, also teaches new generations how to deal with problems and improve human skills (Islami, 2018).

Information technology in theory deals with comprehensive of cutting-edge information, but the technology application is effective only when science or knowledge is put into practical use (McNurlin, B.C., & Sprague, R. H. 2005).

One of many Information and Communication Technology ICT theories is cognitivism, a concept that argues about the need of acquiring knowledge through experience. Compeau and Higgins in 1995, based on social cognitive theory argue for technology acceptance theory, on the model of how teachers preserve their intentions to use ICT for teaching in the future (Compeau & Higgins, 1995). Based on a similar theory Bozdogan & Ozen in 2014 worked on the technology acceptance model TAM, and concluded that the majority of teachers finds themselves self-efficacious in the ICT use for teaching (Bozdogan & Ozen, 2014).

IT in ESD can assist in deficient knowledge issues, missing skills and computer literacy in the young work force to come. It is an assuring process of applying modern education, that will direct human resources towards economic restoration, globalization and skilful, to implement world sustainable goal standards (Barryman & Sauve, 2020).

Pioneer of modern education Adamson in 1921, argued in defence of direct and unmistakable relationships between theory and practice, through devices that took that earliest modern shape in education (JW Adamson, 1921).

The latest theory argues about the integration of knowledge between theory and practice in 'project-based learning in secondary education', but also argues that life's most tasks require a different form of interdisciplinary knowledge and practice (Helle et al, 2006).

Modernized skills especially in IT are essential in order to achieve sustainable activities. New devices are vital for functions in modernized appliances: help cut energy waste and storage for clean air, plastic recycle for degradation, world communication for a global market economy, accessible solar energy for poverty (Bibri & Krogstie, 2020).

The wide of technology is a sign of modernized education. Many things' lines with modern understanding (Wu, Zhan, 2012). Modern education has been considered a process of the rapid growth of the volume of information. In cognition, the process is a method of turning the acquisition

of knowledge environment into entertaining Edutainment. When technology implementation with forms of entertainment is included in traditional lectures, is a feature of Edutainment (Anikina, Yakimenko, 2015). John Dewey greatest American philosopher, emphasized that for humane existence, learning is fundamental. He also pointed that for problem-solving skills, the development of creativity is important, and at no point, education to be an unpleasant process (Devey, 1897). Noddings argued as well that, education main aim should be the happiness of human life (Noddings, 2003). Zuhail quoted Buckingham D (2005), to define Edutainment hybrid education model. Mostly based on visual material and in a game, form tends to be less formal (Okan, 2003).

Technology in education allows interesting ways and opportunities. The main motivation claimed is the learning conditions improvement through flexible education per individual adjustment (Erneling, 2010). It is also an interesting way of the combination of traditional through new technology. Allows students through creativity to study their activities and practical results (Scanlon, 2005). According to the European Commission, the non-formal and informal education are going to be increased (Cerny, 2015).

The era of the 21st century is a technology one. Modern students prefer to use technology in their learning because they find it more attractive when aided by it. ICT has a tremendous impact on education for active learning, collaboration and cooperation (Tinio, 2002). The positive impact enhances the teaching and learning with no geographical limitations. The negative impacts lie mostly on writing skills decline, lack of focus and cheating possibilities (Raja & Nagusbramani, 2018). Still, in the case of Wasit University, innovation education is utilized from educations at large in the classrooms to use time viably. Modern education has been created for student advancements and emphasizes on the technology to transform and guide education (Alaida et al, 2020).

Information Technology in Education for Modern Education and Sustainable Development, is a crucial element for Kosovo to reduce poverty, pollution and environmental degradation, attain political peace, and be a vital pillar of economic development through improved reforms in the education system.

The latest UNICEF research reports a lack of modernized skills resulting from poor quality of education. Even young students in Kosovo are very eager for innovative and a modern one (UNICEF, 2011).

This research intends to examine young students practice learning perspective, regarding technology availability and use in Kosovo, from primary to tertiary education level.

Youth in Kosovo are considered to be an important demographic group in Balkan and Europe. Kosovo has the youngest population in the continent of Europe with over 50% of it. Youth is considered the main driving and prosperous force for a country's future. Even as a majority, young people were left out since after the war in government

decision-making (MCYS, 2017). Small research has been done on education issues in regions of post-conflict, like Kosovo. In Kosovo there are insufficient research materials available, especially ones that include direct youth opinions.

### III. RESEARCH OBJECTIVES

The focus of this study is the examination of the availability and use of IT in the Kosovo education system. The aim is to:

- Identify the availability of computers in schools;
- Quantify the computer knowledge provided, or deficiencies in the schools examined;
- Measure the level of computer practice in the education programs;
- Examine the difference between the public and private sectors;
- Examine the usage of computers in schools, in IT subjects, and in other teaching formats; and
- In higher-level education, explore the IT availability provided for students who are conducting research.

### IV. RESEARCH QUESTIONS AND HYPOTHESIS

The study explores the following research questions:

- What is the availability of digitalization in the education systems of post-conflict regions?
- How regularly does digitalization provide the necessary knowledge and practice in Kosovo schools?
- Is there a difference among public and private sectors?
- Are computers used only in IT subjects, or as well as for non-IT subjects?
- How often are college or university students using computers, and are there sufficient computers available to conduct research?

Post-conflict countries with low economic development lack in available resources, knowledge and practice, of IT in their education systems. To examine this further, we test the following hypothesis:

- Hypothesis 1: Most of the primary, secondary and tertiary-level schools in Kosovo do not have computers available to provide IT knowledge in education.
- Hypothesis 2: Schools that have computers available do not have a sufficient number for everyday use in classes with a slight difference in private sector education.
- Hypothesis 3: The computers, when available and used in schools, they are mostly for IT subjects, and few or none are available for use in non-IT subjects; there is minimal availability for research purposes in higher education.

#### B. Systems, reforms and education in Kosovo

The need for change is an all-time principle, especially in education is highly vital in every step we take (Fullan, 1999, p.1). Hilker (2011), argues that education can also act as a powerful force for peace and recovery factor for fundamental needs especially in the developing regions (Hilker, 2011; Michael, 2001).



Stevenson (2007), has arguments for growing support on the claim that there is a huge difference between calling for “better education” and the practice reality served in schools (Stevenson, 2007).

Until 1999, formal education in Kosovo followed the European system, but after the war education followed the traditional system, which needed radical reform (Fullan, 1999). In cases like Kosovo; escorting weak infrastructure, transforming policy into reality is a difficult task and leaves the country of poor quality in the education system. Traditional education has been considered the main grounds for Kosovo to fall in PISA test, ranking with three bottom countries (Pupovci, 2017; KESP, 2016).

From the end of the war in 2000, many programs were involved in developing the education sector till today (KESP, 2016). Most of the programs involved teacher training, accreditation and licencing (MESTKCF, 2011).

There were attempts to cooperate with international partners to develop e-content and upgrade ICT in schools. UNICEF established children’s funds for education reforms and pointed the need to shift from traditional education into more contemporary (Tahirsylaj, 2013, p.3).

According to Schmidt and White, no education change can be successful if the teachers and students are not involved (Schmidt and White, 2004). The previous traditional education system and teacher training involved one, they have included teachers but not students. Clearly, in the Kosovo case, we have seen more top-down approaches, but bottom-up changes that included directly students are at a minimum, or none. The system remains loaded with inadequate quality on both teaching and learning platforms, with a lack of professional development chances (Tahirsylaj, 2013, p.12).

#### C. *Solution in other countries sustainable education*

In the 21<sup>st</sup> century with the increasing population, the world centre of development for the countries have become economic development (UNNSC, 2011).

Sustainable education development to enlist everyone, became a phrase approaching the end of the 20<sup>th</sup> century. The 1992 earth summit in Rio de Janeiro, produced the agenda for Education, Training and Public Awareness. On Education issues, it was agreed that adult illiteracy is cut by half, possible education for all children (RIO, 1992). World conventions continued with the Johannesburg summit for sustainable development (UNESCO, 2002). A decade later the next level of Sustainable Development introduced the Education notion on top of it (UNDESD, 2014). Nikolai Marfenin theorised that “modern ideologies should be based on a choice between short-term and long-term-benefits”, which raises more the importance of the idea of ESD ([Marfenin, 2007] in Ursul & Ursul, 2018).

ESD was promoted as the best form of education for sustainability. A learning approach to provide quality education, human development and transform oneself and society (UNESCOBKK, 2017). Malone and Somerville argue that ESD besides those leading to transformative

change in the student, it does also activate critical thinking and collaborative decision making among them (Malone and Somerville, 2015).

As opposed to traditional teaching based on memorization, ESD is an approach that deals with concrete teaching. It is a pedagogy that promotes cooperation and collaboration, and among others serves to meet students’ needs (Nolet, 2016). According to Laurie, in practice, EDS is real-world education because the concrete knowledge that students gain contribute to the developing economy. The higher knowledge in practical issues and real-world problems, generates higher competence on future work problems (Laurie et al, 2016). Students should be the central component in education (UNESCO MOD 23, 2017). Different countries have a different perspective of ESD. Korea’s perspective on ESD is; actual problem-solving skills for students, similar to Sweden; they get further in knowledge and development and work on meaningful perceptions. Curriculum with ESD increases student commitment, engagement and self-esteem/awareness like in Canada, Germany, Japan, Estonia. The main goal is to support the majority of students in developing knowledge, values and skills for a sustainable future and development (UNESCO, 2017).

#### D. *IT for sustainable modern education, solution reforms*

One of the most significant challenges of the 21<sup>st</sup> century is sustainable development (Pearce & Atkinson, 1998). To be sustained is to support life by developing people in education, economy and through that a region society (Haghseta, 2003). The significant trend of rapid development and application of IT, is a revolution that leveraged sustainable development, especially empowering developing countries.

Learning theories in education include several major concepts. Besides the concepts of cognitive psychology, the process of acquiring information (Greeno, Collins & Resnick, 1996), is also the experiential learning. Experiential learning is a process of engaging one which is based on learning by doing. It is an opportunity for students to engage intellectually, creatively, physically (McCarthy, 2016). In a case study in Malaysia and Arabia, the research on a technology acceptance model showed that; students had high intention and satisfaction for technology use in education. It was considered ICT to have a significant influence on sustainable education (AL-Rrahmi et al, 2020).

A development learning process that produces multiple intelligence by combining theory and practice, is a crucial one for growing sustainable economies. The concept of development suggests that, regions grow to become self-sustaining partners in the so-called global economy. This concept was raised from the need for the information society, aided by information sharing and the application of knowledge (Qureshi, 2005). One of the theories of ICT is constructivism. It is a concept of build and rise which lies in the argument of tool development for the effective classroom in education case (Kalina & Powell, 2009).

#### A. *Practice and, other countries perspective contribution*

Analysing literature arguments lie on behalf of ICT use for effective and efficient development, through many success stories. Duncombe and Heeks (2002) suggests that, the role of ICT in enabling information and knowledge is important for social and economic development, as an intermediary market information provider, customers, and suppliers (Duncombe & Heeks, 2002). Through communication, locals were able to articulate their understanding, knowledge and views (Puri&Sahay, 2003).

ICT contributes also to poverty reduction. Improvements in healthcare have been shown to reduce poverty like telemedicine diminishes the distance to travel for medical attention, services and workers (Kimaro & Nhampossa, 2005).

Supporting development to address: the extent to enrich people's lives in isolated areas, records of development objectives achieved, development and sustainability (Steinberg, 2003).

In developing countries internet opened up new opportunities for companies to work with developed countries, access skills and expertise, by becoming increasingly interdependent.

(ITD) Information Technology for Development stimulates constructivism of social and economic development, through powerful communication components (World Bank, 2003; p.1). Steered by that pattern, the trend of IT for development has become a global phenomenon.

The greatest skill for the knowledge society in the 21<sup>st</sup> century is the ICT practice used for student improvement (Anderson, 2008).

Governments spent considerable funds for ICT use in developing countries as positive relation of technology adoption and economic growth (Temple, 1998). In controversy in Latin America in Chile, this discourse did not result in the expected outcome. Silva & Figuerola (2002), revisited the idea. It resulted in facts that ICT adoption should be implemented through the framework of institutional approach at the national level for education, for development outcome.

Education seems to strengthen with the ICT implementation skills in South Africa and Malaysia. The establishment of learning centres brought greater computer literacy training (Rodrigo, 2003).

In the case of golf countries; Arabia, Emirates, Qatar, and more, the investment on general use and availability of ICT in formal mass education, has had a great impact on nations innovation and economic growth. ICT was quickly implemented to build capacity knowledge through the national education system. The incorporation of ICT in all levels of education has increased dramatically and it was considered the catalyst of education and knowledge development (Wiseman & Anderson, 2012).

In primary schools in Spain teachers had a great influence on teaching practices. They combined in learning mobile technology and media as a good instrument for pedagogical transformation. It resulted in more knowledge sharing among students, engagement and autonomous learning. Teachers should focus on new ways of their teaching practices, by facilitating access to information, engagement and collaboration (Domingo & Gargante, 2016).

Quantitative research paradigm in primary schools of Belgium on ICT integration, backs up the theory that, ICT use should be school's phenomenon, not teachers only. More so, institutionalising ICT use in schools, creates a positive association with competence and professional development, but it may vary on school differences (Vanderlinde, Aesart & Braak, 2014). Often is claimed that quality of education is associated with the use of technology. From the internalist approach research in the US, the use of ICT for teaching in universities needs to be an organizational phenomenon with strong support. IT in the industry is a demand for success that facilitate time, and is a bullet for quality and cost. Governments usually influence universities directly or indirectly. So, the education system gets analysed by governments. If they do not facilitate the education system, they are considered to hinder factor (Nnazor, 2009).

In the Kosovo case, it may be considered a promising framework that could equip the student with the necessary needs and skills, in our case technologically able for a growing economy (Laurie et al., 2016, p. 236). Jorgenson, Ho and Stiron argued how IT skills are important to gain in high school, but not mentioned the importance of including practice for higher competence (Jorgenson, Ho & Stiron, 2003). IT advantages and knowledge enables easier entrance on world markets and innovations. Changes are essential to delivering skilled students for a growing economy, especially for transition regions and countries like Kosovo (Tahirsyzaj, 2010).

## V. METHODS

Despite constraints from pandemics of covid-19, an empirical effort approach in both primary and secondary data collection and analysis is taken. The research employs in person survey-based evidence provided directly by students. The research responds to the review model of testing the hypothesis, showing the reality of the education in post-conflict regions regarding the IT use in different sectors, and what it should be in order to achieve sustainability and economic development. To conclude the position of young students of all levels in their education, the design of an in-person survey enabled to capture their exact measures with nominal opinions, on existing education in Information Technology through their classroom practices and everyday experience.

### A. IT for ESD Survey

An internet-based survey has been considered as a widely used survey method in which a sufficient number of students might have been engaged. It was also convenient for the covid limitations, but an opened covid free school time was chosen carefully. Taking into consideration a few elements and the physical presence in the country, a different approach (no internet-based) was thought to be the best reliable option. The research surveys different ranks of students, from early primary up to tertiary. It has been assumed that young ones might not be able to answer the questionnaire on the internet, and many of seniors might not possess computers or internet available. Also doing it in person, it has been presumed on at least one free opinion open question for those willing to have a say.

Kosovo has demographics of over 90% Albanians and the survey was formulated in the Albanian language. Other ethnical groups like Serbian living on small enclaves as a separate minimal group that doesn't represent any majority, were not included in the research.

The main focus for conducting the survey was taking into account the primary relationship among variables for testing the hypothesis. Based on convenience for checking the IT knowledge in education and computers available in class, the groups to survey were; the primary, secondary and tertiary students of both public and private sectors to compare. The norm for chosen students was the voluntary one, only after being explained and consent for the survey, assuming that volunteer participation shows high motive interest in finer education for sustainable development.

### B. IT for ESD Design

Designing the survey questions had to derive directly from the problems identified on post-conflict regions low economic stability, presuming from poor education that kept the country back from sustainable future development.

Findings have shown that productivity and performance in the country, is lacking mainly from low skilled and missing technology. That is why the substance of the survey has drawn the attention to investigate, how much of these skills are being taught in the education system in Kosovo.

To find out from the ground if; the computer skills are available for students, how much they are used, the perception of importance, which school sector they belong to, the questions were written carefully to measure issues addressed mostly in quantity.

The survey answered only from the students' perspective, putting the students in the position of driver's seat, to address the problems in the most realistic measure, without the interference of teacher's autocracy. The survey was composed of mostly closed-ended questions. Questions designed to measure; a yes or no response, the degree of quality or displeased perception in 1-5 rank, or low, medium, high level, direct from student's verdict.

Students' responses and opinions are the basis for this survey, so the grounds for adding to the survey one open question, gives them a free will experience exposure to have a say.

The survey was carefully instrumentally designed to gather as much information input based on numerical description outcome developments (Yilmas, 2013). Quality as possible, less time consuming for the students, especially for the young ones to make sure not to bring any discomfort at no time. The time for few questions survey competition for juniors of 1-5 and 6-9 grades, is max five minutes to complete. Whereas for the seniors of the high school and tertiary category, the survey takes about ten minutes to complete, with maybe a few minutes exception for the open question to express a wanted issue.

The free feedback sentence helped addressed the issues not being questioned, but important and relevant in regards to schooling practice in reality. Since the respondent does not need to confer their identity there is no need for data protection for the anonymity of participants. Although the parent consent for students under sixteen for ethical research, necessary to obtain (Kaye et al., 2015).

The consent is grasped through parental and participation information forms (Tene & Polonetsky, 2012). The data collection, interpretation and analysis are carried by the researcher, the author of the papers.

Research purpose rests on direct students' perspective, it was distributed in chosen schools in person with no personal questions, except which level IT and sector they belong. The work conducts pre-planned the variables of demographics and categories of students to be surveyed. The final expectation lies in the variable correlation of one-time measurement of calculated production (Frerls & Onwegbuzie, 2013).

#### ➤ Independent variables:

- PS- primary school
- HS-high school
- TS- tertiary school

#### ➤ Mediating variables:

- CA-computer available
- CU- computer use
- CK-computer knowledge

#### ➤ Dependent variables:

- PU- public
- PR- private

In order not to interfere with students learning process and the constraints of pandemics, the survey was available that particular day at chosen school. Three of each level and category were surveyed in a total of 9. The total learning institutions in five different cities surveyed were: three from 1-5 and three from 6-9, three from high school, three from tertiary, with 10 respondents of each in the public sector, and exact the same measures in the private one. In total 18 institutions of both sectors.

C. IT for ESD survey collection

Table 1. shows the examination of schools surveyed in the country, cities they belong to, level of education and the

system category.

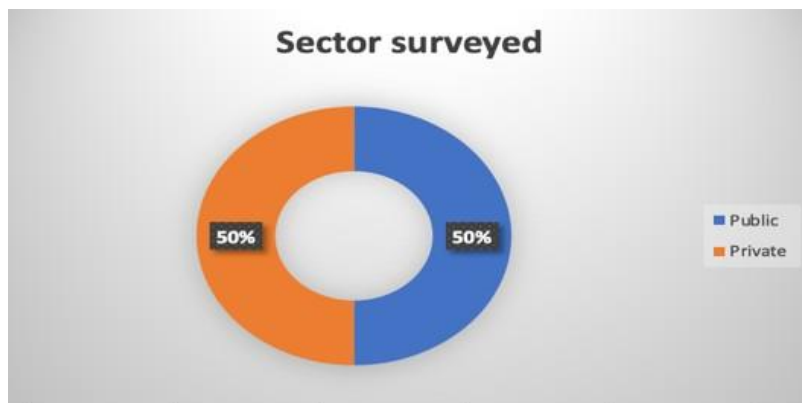
Information table of schools surveyed

Table 1: Schools surveyed

School	City	Level	Category
Mihal Grameno	Fushe Kosove	Primary 1-5, 6-9	Public
Hivzi Sylemani	Fushe Kosove	Highschool	Public
Faik Konica	Prishtine	Primary 1-5, 6-9	Public
Xhevdet Doda	Prishtine	High	Public
Sadulla Brestovci	Gjilan	Primary 1-5, 6-9	Public
Asllan Elezi	Gjilan	Highschool	Public
UP-Technics, IT	Prishtina	Tertiary	Public
Arts University	Prishtina	Tertiary	Public
Kadri Zeka Uni	Gjilan	Tertiary	Public
ASK	Prishtina	Primary 1-5, 6-9	Private
Universum	Ferizaj	Primary 1-5, 6-9	Private
Hello academy	Gjilan	Primary 1-5, 6-9	Private
Universum	Ferizaj	Highschool	Private
ASK	Prishtina	Highschool	Private
Memet Akif	Prizren	Highschool	Private
AAB College	Fushe Kosove	Tertiary	Private
Heimerer college	Prishtina	Tertiary	Private
UBT-technology	Prishtina	Tertiary	Private

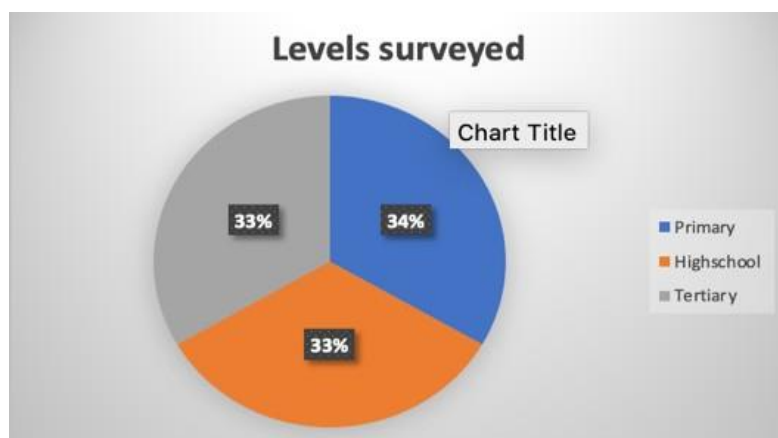
The graphs below illustrate units of analysis synthesised in measures to be analysed. The sector surveyed as the

research aimfor accurate analysis, surveyed equally number of schools in both sectors: public 50% and private 50%.



Graph 1: Sector survey

Research purpose aim equality on teaching level number of surveys. All three levels of Primary, Secondary and Tertiary were proportionally examined.

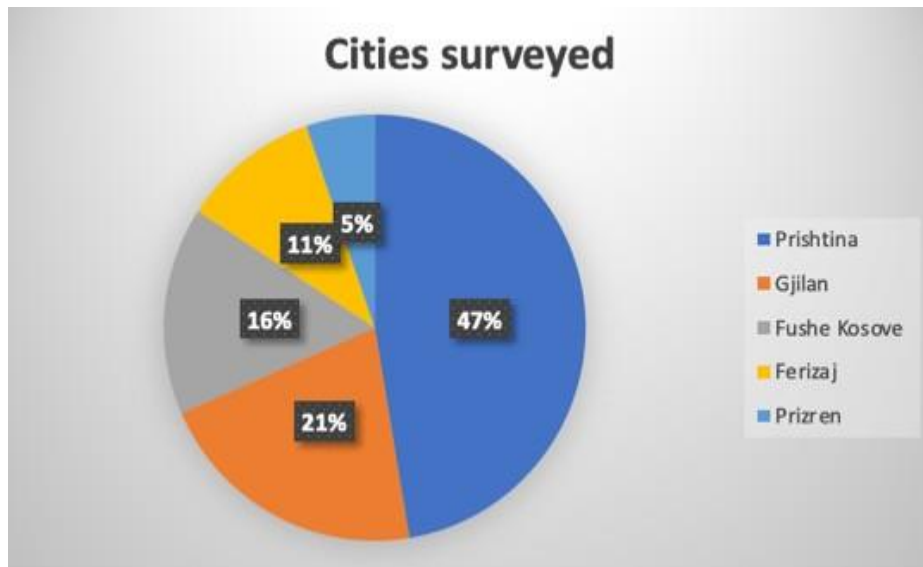


Graph 2: Teaching levels



The research survey was distributed upon demographics of the country as to given chance a possibility. Pristina was

the majority surveyed as the capital of education concentration, with several other cities around the country.



Graph 3: School demographics

**D. Examination Analysis**

The first examination report, is data collection of CA in school. A total of 30 respondents of each category and sector resulted: 1-5 10 cases of yes, 4 no and 16 don't know in public, whereas in private sector 20 yeses, 0 No and 11 don't know.

6-9 22 yes, 2 no and 6 don't know in public, in private 29 yes, 0 no, 1 don't know. Highschool 18 yes, 6 no and 6 don't know in public, private with 30 yes and 0 of no and don't know. Tertiary public; 12 yes, 10 no and 8 don't know, with private 22 yes 1 no and 7 don't know.

Table 2: CA in School

Category	Yes	No	I don't know	Public	Private
1-5	10	4	16	-	-
1-5	20	0	11	-	-
6-9	22	2	6	-	-
6-9	29	0	1	-	-
Highschool	18	6	6	-	-
Highschool	30	0	0	-	-
Tertiary IT Non-IT	7	0	0	-	-
Tertiary IT Non-IT	5	10	8	-	-
Tertiary IT Non-IT	10	0	0	-	-
Tertiary IT Non-IT	20	0	0	-	-

CA in class resulted in all cases of all categories and sectors with a total of no.

Table 3: CA in class

Category	Yes	No	Public	Private
1-5 primary		30	-	-
6-9 primary		30	-	-
Highschool		30	-	-
Tertiary		30	-	-

Separate computer cabinet examination results; 1-5 in public with 6 yes, 3 no and 21 don't know, in private 20 yes, 0 no and 10 don't know. 6-9 public, 23 yes, 1 no and 6 don't know, private 28 yes, 0 no and 2 don't know. Highschool

public with; 17 yes, 6 no and 7 don't know, private 30 yes total. Tertiary public, 11 yes 11 no and 8 don't know, private 22 yes 1 no and 7 don't know.



Table 4: Separate Computer cabinet available

Category	Yes	No	I don't know	Public	Private
1-5 primary	6	3	21	-	
1-5 primary	20	0	10		-
6-9 primary	23	1	6	-	
6-9 primary	28	0	2		-
Highschool	17	6	7	-	
Highschool	30	0	0		-
Tertiary ITNon-IT	7	0	0	-	
	4	11	8		
Tertiary ITNon-IT	10	0	0		-
	12	1	7		

Computer practice hour survey resulted in data of; 1-5 0 yes and 30 no in public, in private; 21 yes and 9 no. 6-9 17 yes and 13 no in public, in private 28 yes and 2 no. Highschool in

public 14 yes and 16 no, in private 30 only yeses. Tertiary in public 7 yes and 23 no, private 10 yes 20 no.

Table 5: Computer practice hours

Category	Yes	No	Public	Private
1-5 primary	0	30	-	
1-5 primary	21	9		-
6-9 primary	17	13	-	
6-9 primary	28	2		-
Highschool	14	16	-	
Highschool	30	0		-
Tertiary	7	23	-	
Tertiary	10	20		-

Computer knowledge use responses among public and private; Yes 13 and 17 no, with 20 yes and 10 no in 1-5 category. In 6- 9 30 yes total in public, with 26 yes and 4 no in private. Highschool; 30 yes public and 29 yes and 1 no in

private. In tertiary 29 yes and 1 no in public and 30 yes in private. All results with different varieties among low, medium and high differences to be interpreted in knowledge.

Table 6: Computer use knowledge

Category	Yes Low	Medium	High	No	Public	Private
1-5 primary	13	0	0	17	-	
1-5 primary	10	10	0	10		-
6-9 primary	16	9	5	0	-	
6-9 primary	11	10	5	4		-
Highschool	9	15	5	1	-	
Highschool	10	18	3	0		-
Tertiary	13	10	6	1	-	
Tertiary	15	9	6	0		-

Computer days used in a week data collection resulted in: 14-0 days, 11-1 days and 5-2 days in public, in private 10-1 day, 8- 2 days, 9-3 days and 3-4 days for high school

category. For tertiary; 23-0 days use, 3-1 day and 2-2 days in public, in private 10-0 days, 3-1 day, 6-2 days and 11-3 days.

Table 7: Day's computer weekly used

Category	Day's use	0	1	2	3	4	5	Public	Private
Highschool	14	11	5	0	0	0	0	-	
Highschool	0	10	8	9	3	0	0		-
Tertiary	23	5	2	0	0	0	0	-	
Tertiary	10	3	6	11	0	0	0		-

Examination on computer use in IT subject shows; 15 yes and 15 no in public, private 30 yes, in high school category. In tertiary 5 yes and 25 no in public, with 30 yes in

private. All results are with different ranks among low, medium and high for interpretation.

Table 8: Computer use in IT subject

Category	Yes Low	Medium	High	No	Public	Private
Highschool	10	5	0	15	-	
Highschool	10	17	3	0		-
Tertiary	3	2	0	25	-	
Tertiary	0	5	25	0		-

Computer use on non-IT was also needed to collect for results; Highschool in public with, 1 yes and 29 no, private 15 yes with 15 no. Tertiary public scored 0 yes with 30 no, public

16 yes and 14 no.

Table 9: Computer use in the non-IT subject

Category	Yes Low	Medium	High	No	Public	Private
Highschool	1	0	0	29	-	
Highschool	8	6	1	15		-
Tertiary	0	0	0	30	-	
Tertiary	10	6	0	14		-

How much seniors use the computer for research they scored; public 0 yes and 30 no, private 6 yes with 26 no, in

high school category. In tertiary; 0 yes and 30 no in public, private 13 yes with 17 no.

Table 10: A computer uses for research

Category	Yes Low	Medium	High	No	Public	Private
Highschool	0	0	0	30	-	
Highschool	5	1	0	24		-
Tertiary	0	0	0	30	-	
Tertiary	13	0	17	0		-

*E. Perception analysis*

The last two data collected questions were based more on students' perceptions. In the question of if they think CA is low, the results are as such; 29 thoughts so yes, 1 no in public,

in private 20 thought yes and 10 no, among high school category. In tertiary 30 thought yes in public, in private 25 yes with 5 no.

Table 11: Low CA perception

Category	Yes (1-5 rank)					No	Public	Private
	1	2	3	4	5			
Highschool	21	8	0	0	0	1	-	
Highschool	0	7	10	3	0	10		-
Tertiary	27	3	0	0	0	0	-	
Tertiary	0	6	10	9	0	5		-

The second data collection was on student perception level of CA in practice is work related advantage. Highschool category; public 2 cases of 1 rank, 2-2, 4-3, 16-4 and 6-5. In

private 4 or rank 4, 11-4, 15-5. Tertiary scored; public, 1 case of rank 2, 6-3, 7-4, 16-5. In private; 1 case rank 2, 4-3, 11-4, 14-5.

Table 12: Work-related CA advantage perception

Category	Yes (1-5 rank)					Public	Private
	1	2	3	4	5		
Highschool	2	2	4	16	6	-	
Highschool	0	0	4	11	15		-
Tertiary	0	1	6	7	16	-	
Tertiary	0	1	4	11	14		-

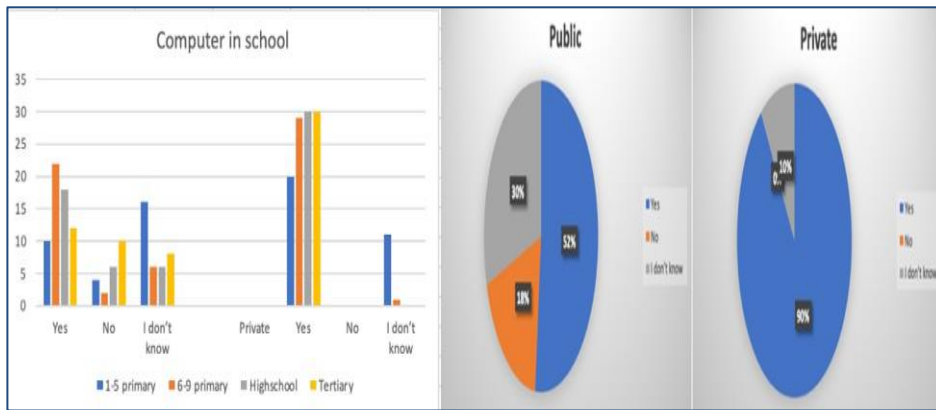
**VI. INTERPRETATIONS**

Post-conflict countries with low economic development lack in available resources, knowledge and practice of IT in their education system. The following hypothesis has been tested.

Base drive research expression states that: post-conflict countries with low economic development lack in available resources, knowledge and practice of IT, in their education systems. The data above collect and analysed, interpret the hypothesis stated. Most of the primary, secondary and tertiary-level education institutions in Kosovo have minimal computer availability to provide IT knowledge in education.

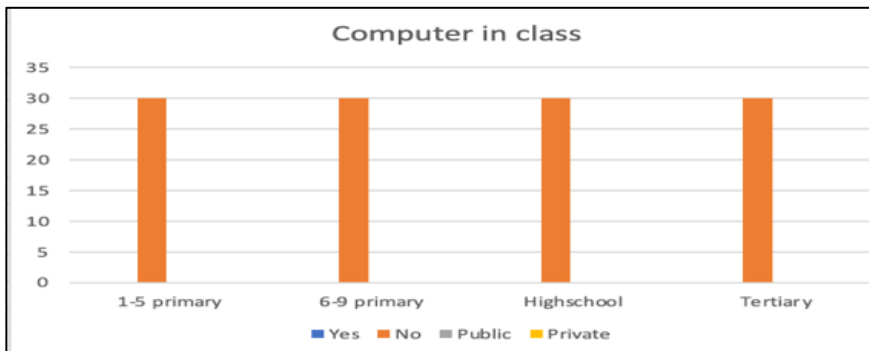
Graph 4, shows data results collected in low-high primary, secondary, tertiary school categories and public and private sectors. In the public sector 52% of students responded yes, 18% no and 30% don't even know if they have

a computer available in school at all. In the private sector over 90% of students states to have a computer available in school, and a minimum of 10% don't know (Microsoft Excel, 2011).



Graph 4: CA in school

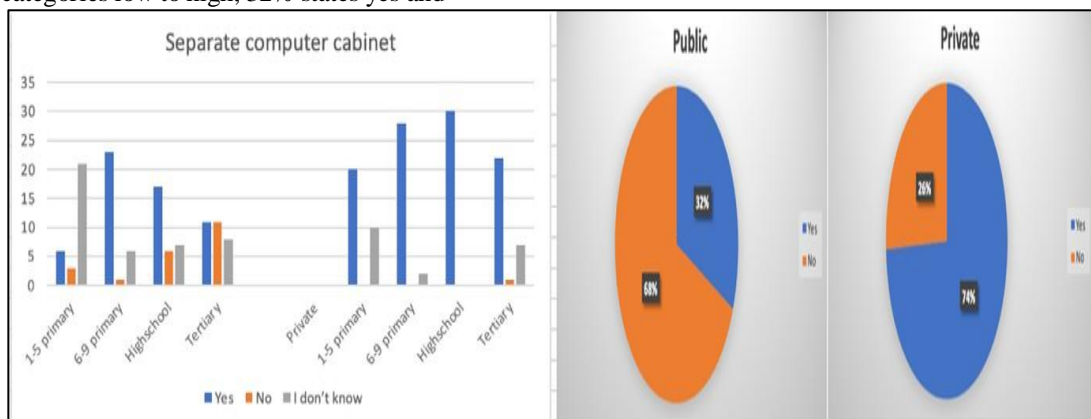
In response to a computer available in class, all categories from both sectors do not poses computer in class provided by the school.



Graph 5: CA in class

The important question was to find out whether they have separate computer cabinets available in schools. In the public sector on all categories low to high, 32% states yes and

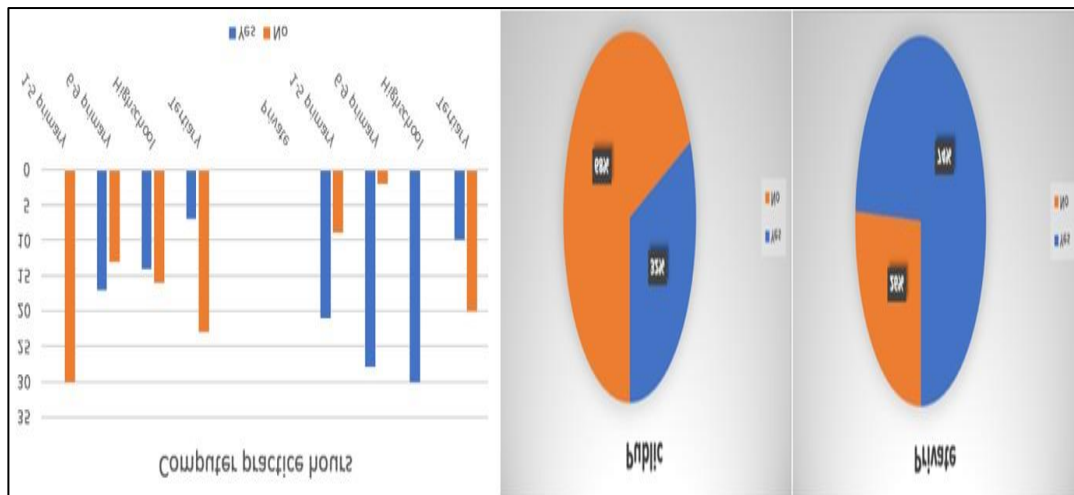
68% no. In private the response is the opposite, 26% no 74% yes.



Graph 6: Computer cabinet available

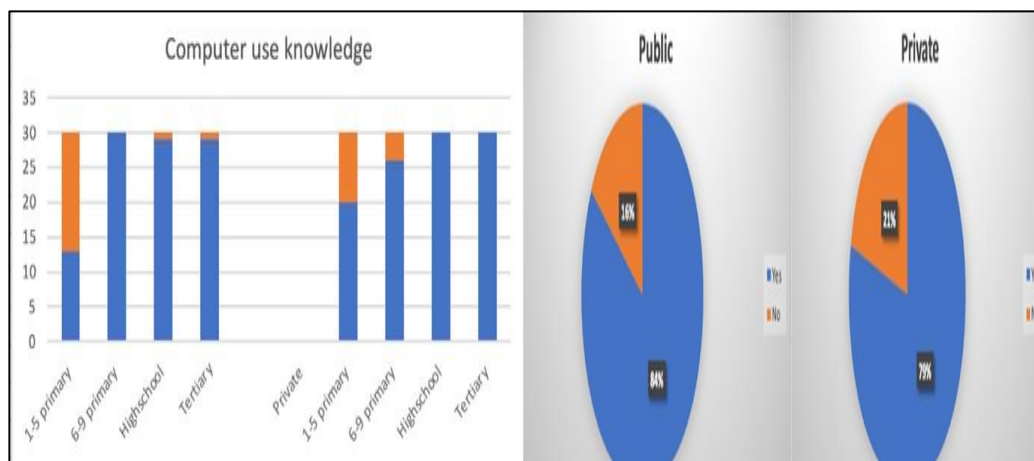
The results shows that most of the primary, secondary and tertiary level schools in Kosovo they state to have computers but no in class and minimal computer cabinets available for them in public sectors. In the private sector, they do have a lot more IT availability nowadays.

Besides availability, the practice use is at important. Response to computer practice hours is 32% yes and 68% no in public, but in private is 74% yes with 26% no.



Graph 7: Computer practice hours

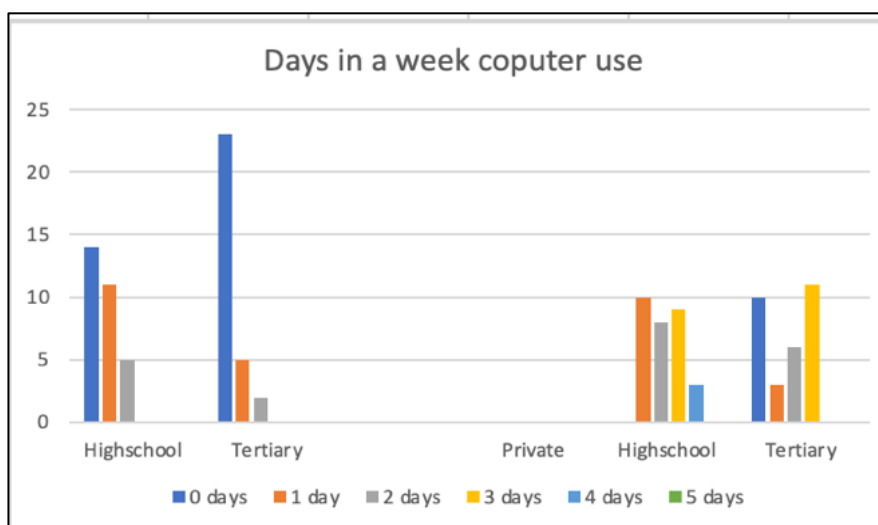
Survey on what is broad computer use knowledge scored over 70%. Most of both public and private sectors of higher education's know basic computer use.



Graph 8: Basic computer use knowledge

Most of the students from the higher rank category stated that they use a computer in school less than one day per week, and very rare over two days in the public sector. In the

private sector fewer students use a computer in school for less than one day, most of them uses 2 to 4 days per week.



Graph 9: Computer use days in a week

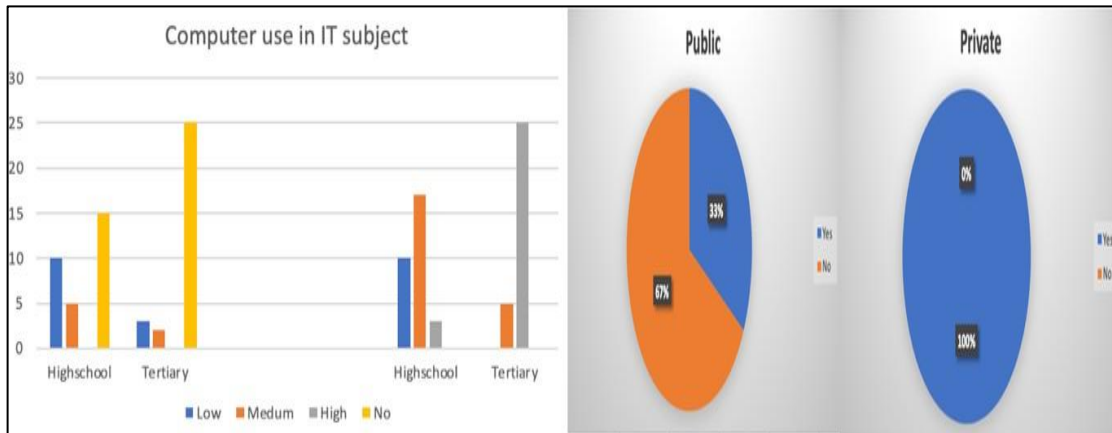


The second hypothesis states that, even the schools that have computers available, they do not seem to have sufficient numbers for everyday use in classes, with significant differences in the private sector. Although students of all levels and sectors claim to have basic knowledge use for a computer in their everyday life, the scores show the facts: Computer practice hours in the public sector is less than 65% and one day of use per week. Private shows over 70% percent on practice hours, with a minimum of 2 to max 4 days per

practice use.

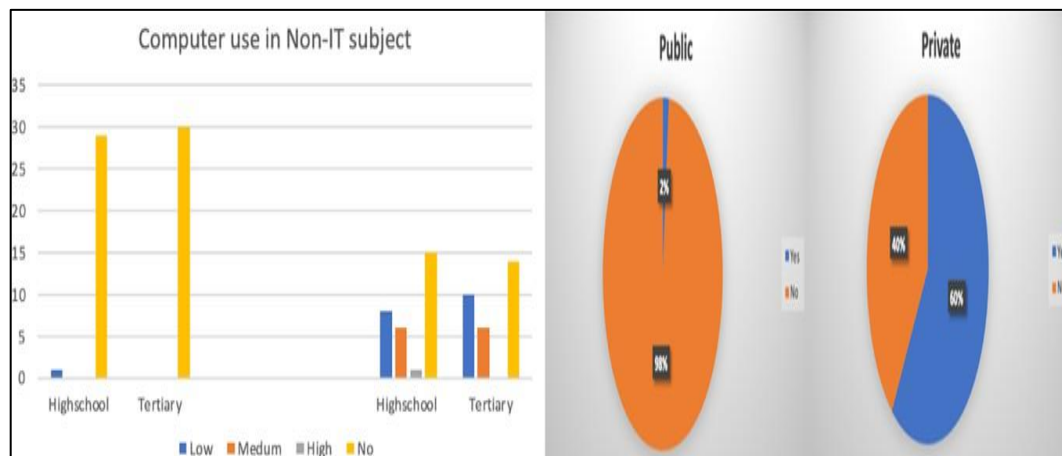
The third hypothesis raises the assumption that computer use in schools is mostly directed for IT to use subjects, but not as much for non-IT subjects, like research for higher education purposes.

Graph 10, shows the computer use response for IT subjects in public is less than 33%, but in private is 100%.



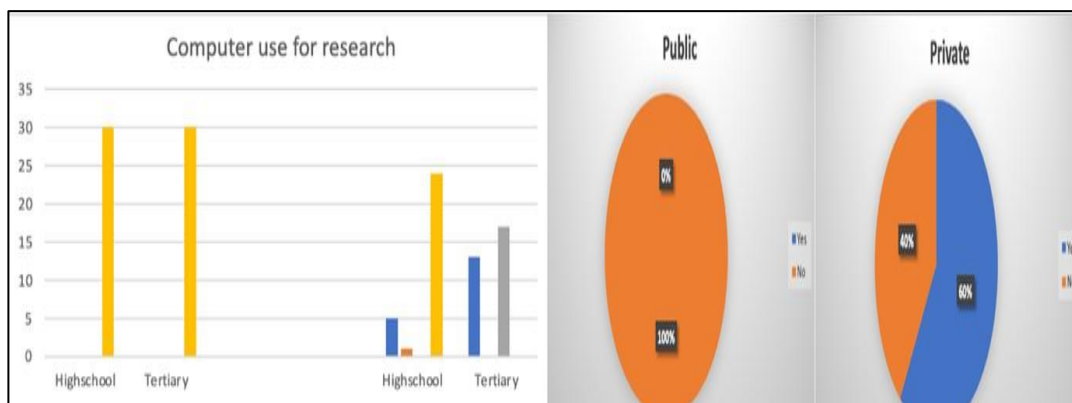
Graph 10: Computer use for IT subject

For non-IT subjects the responses are: for public sector computer use is only 2%, but in private one is over 60%.



Graph 11: Computer use for non-IT subjects

Similar responses are in computer use for research. In public, for research purposes there is no use at all in teaching institutions. In the private sector, the use for research is over 60%.



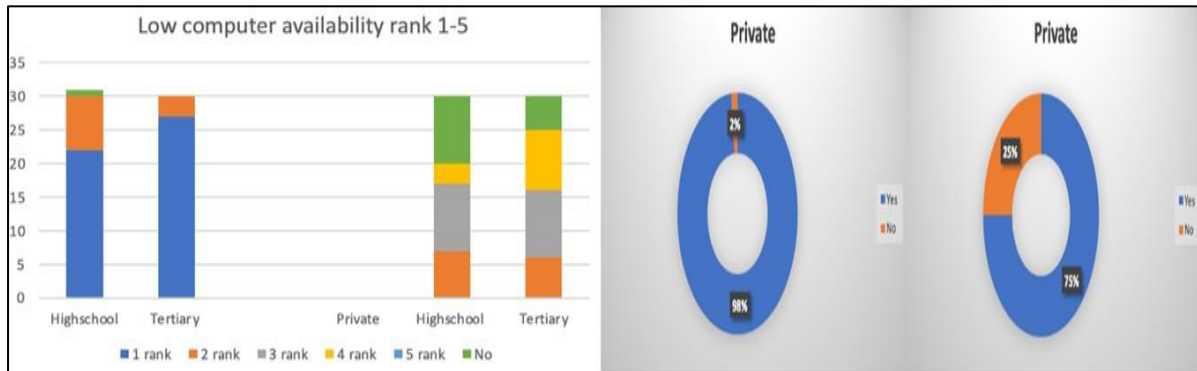
Graph 12: Computer uses for research

So, both graph 11 and 12 verify the third hypothesis, especially in the public sector for minimal use of computers in the learning process non-IT related.

**Role of IT**

The survey questionnaire included a few perception

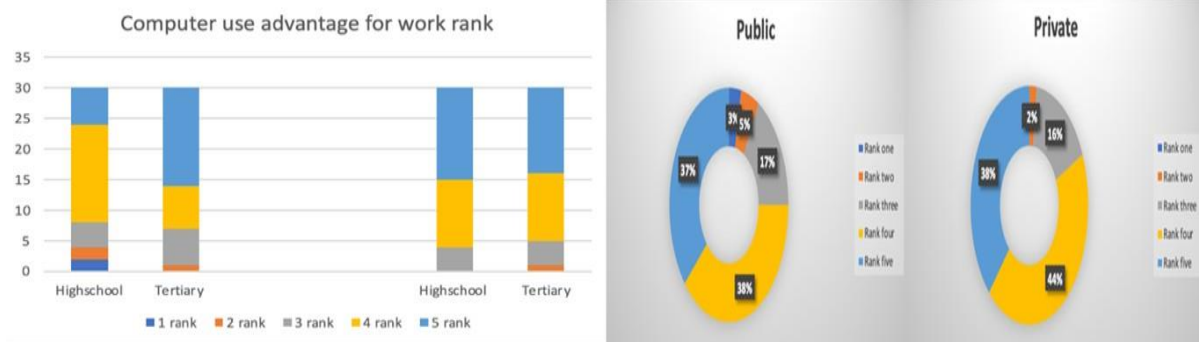
responses from students of higher levels. Even the private sector all-timescored higher availability and use responses. Over 70% of students' perception is of low computer availability in their institutions. In public sectors is over 90%.



Graph 13: Rank perception of low computer availability

If more computers available and use is an advantage for work, students' perception was similar nearly same in

both sectors. They both scored 4 to 5 ranks on higher computer use for work advantage.



Graph 14: Rank perception of computer use work advantage

**VII. FINDINGS AND DISCUSSION**

In regards to CA availability as assumed from the review, half of the students in Kosovo of all categories don't claim to have a computer in school in the public sector, in

difference to private that most of them claim to have. Chi-square statistical analysis of variable effects model of Scheffe (1974) shows significant results between CA in the public and private sector.

Table 13: Variable statistical analysis on CA public and private

	Results				
	public	private			Row Totals
yes	52 (71.00) [5.08]	90 (71.00) [5.08]			142
no	48 (29.00) [12.45]	10 (29.00) [12.45]			58
<b>Column Totals</b>	100	100			<b>200 (Grand Total)</b>

The chi-square statistic is 35.0656. The p-value is < .00001. The result is significant at  $p < .05$ .

They also claim to have separate cabinets for computers in the majority in the private sector and minimal claims in the public sector, which is proved also through significant

statistical chi-square results.

Table 14: Variable statistical analysis for cabinets on public and private

Results						
	public	private				Row Totals
yes	32 (53.00) [8.32]	74 (53.00) [8.32]				106
no	68 (47.00) [9.38]	26 (47.00) [9.38]				94
<b>Column Totals</b>	100	100				<b>200 (Grand Total)</b>

The chi-square statistic is 35.4075. The *p*-value is < .00001. The result is significant at *p* < .05.

The most no and I don't know responses came from young students of 1-5. They even on body gestures expressed their unfamiliarity with technology availability and knowledge.

Surprisingly all students from both sectors and categories, did not claim to have computers available in the class for learning in all cities surveyed.

Even so, they claim to have medium computers availability in public sectors, approximately three-quarters of students claim low computer practice hours during the school weeks. In the private sector on the contrary, a quarter of the students claim not to have enough practice computer hours. However, it is fascinating fact that in the question of: do you know how to use the computer, most of the students in both sectors know how to basically use it. The response is the reason for use also from home. Only very young age from 1-5 response on poor use or none.

To observe the matter more realistically, the research examined more precisely the issue. The survey continued with more specific questions for senior students like high school and tertiary. As per days in a week use, most of the public students in high school they use 0 to 1 day, whereas in the private sector they use moderate of 3 to 4 days per week.

In the IT subjects, there is a strange response in the public sector, most of the students of tertiary response are no, and some of high school students use it medium to low.

In open questions, students responded that, in the public sector cabinets are closed and keys are held from professors only for their programming lessons. In difference in the private sector there is medium use in high school and high use in tertiary.

The use of computers for non-IT subjects is extremely poor almost 100% for the public sector. The public sector is showing good moderate results with over half measure of use.

Table 15: Variable statistical analysis on IT use for IT and Non-IT subjects

Results						
	IT	No-IT				Row Totals
public	33 (23.81) [3.54]	2 (11.19) [7.54]				35
private	99 (108.19) [0.78]	60 (50.81) [1.66]				159
<b>Column Totals</b>	132	62				<b>194 (Grand Total)</b>

The chi-square statistic is 13.5265. The *p*-value is .000235. The result is significant at *p* < .05.

There are similar findings on computer use for research among the public and private sectors. All of the students in the public claim to not use a computer for research in their institutions, but in a private large number of students, they have use for it.

Findings state that Kosovo has not provided enough attention on Information Technology importance in modern education. Lack of technology use was manifested in lower productivity and innovation in the review of the literature. It is fascinating how examining the situation, it has also observed the same finding from students' perception. How much they thought and rank the computer use as a work-related advantage; the findings were the same. All students in Kosovo they are aware that with greater technological skills, they have a greater chance for a sustainable job and a stable future.

## VIII. SUMMARIES

### A. Significance

Literature examination indicated unsurpassable research necessity, on IT availability and use in education in post-conflict regions.

Post-conflict countries require development; they have minimal use of IT and investment, with differences among sectors. Their future development requires technology upgrade and use in education, for skilled and innovative young work force generations. The current situation does show the level of IT availability for skills and utility. Investments are not sufficient on the essential public sector. The research shows the presently observed situation in place. Research has drawn answers derived from examination, on an understanding of the cause of poor economy, skills and education. The examination addresses the current

digitalization in Kosovo education. It is an example of understanding the Information Technology availability situation in a post-conflict country. Findings indicate that IT availability is insufficient, especially in the public sector, and is a rare and unique research on this case. The IT used for skills measurement, provide material for IT education with its special importance in post-conflict countries. Ultimately the contribution goes to empiric examination on education importance for development. An important treasure for students, academics and libraries and universities for the referring category.

### B. Limitation

The generalization on IT and the role in education for modern skills, were designed to be extracted from a questionnaire survey. It was limited to a single country for the chosen post-conflict category. The plan has undertaken the work to clarify the situation from the cases examined. Literature has collected information on broad IT usage. The research necessity was to point its effort, to find more precise information on technological use in the examined categories. It has produced more thorough studies on IT availability and skills in post-conflict areas. IT use in schooling requires the further need of examination. Limitation on the variables used involves quantitative measures with fewer explanatory outcomes, and valuable descriptions. Students showed high motivations for descriptive complaining information. Large gaps can be uncovered in technological skilled education, for productivity and innovation. An infinite amount of hidden vital information and knowledge.

## IX. CONCLUSION

According to economic development, the UN ranks countries among; developed, developing and those in transition, recently derived from post-conflict. No doubt, their level of development contains diametrical differences, many factors associated. Post-conflict countries with minimal development, lack in available; resources, knowledge and practice of IT, in their education system. Kosovo as one amongst them, suffers from poor economic development and prosperity, consequence assumed from insufficient technological use and knowledge, in the education system. From such reports, the theorises can be supported only after education examination in the field was more than necessary and done.

Most of primary, secondary and tertiary education levels, do not have computes available to acquire proper knowledge in education. More so if they do, the number is minimal. This situation changes among the public sector, in favour of the private one. The availability when exist, mostly it is for only IT subjects. For Kosovo as a subject of a complicated past and shuttered political system, poor economy and education solutions are achieving a sustainable system through IT integration.

The research results shows that IT availability in Kosovo schools is moderate. The knowledge and use in education, quite lower than availability. In primary schools in the public sector, it is minimal and for some very young students unknown, whereas in high school slightly higher,

and in tertiary is disappointing low. In difference to the private sector as assumed in higher investment, the availability is high in all schooling categories, with less use in very young pupils. An interesting observation was among both sectors and categories. Identical responses were drawn on the perception that, IT availability and knowledge is the foundation of importance for students for future work relations and global integration.

Country development is essential, especially for the handy capped ones. The future path falls through the digitalization of the 21st-century global market. One that requires high skills, competition and innovation. For Kosovo is the only path, to level its workforce and standards with EU countries, through sustainable modern education skills application.

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