November, 2016
Special Issue for INTE 2016

Prof. Dr. Aytekin İşman
Editor-in-Chief

Editors
Prof. Dr. Jerry Willis
Prof. Dr. J. Ana Donaldson

Associate Editor
Assist. Prof. Dr. Fahme Dabaj

Assistant Editor
Assoc. Prof. Dr. Eric Zhi - Feng Liu

ISSN: 1303 - 6521

Indexed by
Education Resources Information Center – ERIC
SCOPUS - ELSEVIER
Message from the Editor-in-Chief

Dear Colleagues,

We are very pleased to publish Special Issue for INTE 2016 conference. This issue covers the papers presented at 7th International New Horizons in Education Conference which was held in Vienna, Austria. These papers are about different research scopes and approaches of new developments and innovation in educational.

Call for Papers

TOJET invites you article contributions. Submitted articles should be about all aspects of educational technology. The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to TOJET. Manuscripts must be submitted in English.

TOJET is guided by its editors, guest editors and advisory boards. If you are interested in contributing to TOJET as an author, guest editor or reviewer, please send your CV to tojet.editor@gmail.com.

November 2016
Prof. Dr. Aytekin ISMAN
Sakarya University
Editorial Board

Editors
Prof. Dr. Aytekin İşman - Sakarya University, Turkey
Prof. Dr. Jerry Willis - St. John Fisher University in Rochester, USA
Prof. Dr. J. Ana Donaldson - AECT, Past President

Associate Editor
Assist. Prof. Dr. Fahme Dabaj - Eastern Mediterranean University, TRNC

Assistant Editor
Assoc. Prof. Dr. Eric Zhi - Feng Liu - National Central University, Taiwan

Editorial Board
Prof. Dr. Ahmet Zeki Saka - Karadeniz Technical University, Turkey
Prof. Dr. Akif Ergin - Başkent University, Turkey
Prof. Dr. Ali Al Mazar - Alfaaisal University, Kingdom of Saudi Arabia
Prof. Dr. Ali Ekrem Özkul - Anadolu University, Turkey
Prof. Dr. Antoinette J. Muntjewerff - University of Amsterdam
Prof. Dr. Arif Altun - Hacettepe University, Turkey
Prof. Dr. Arvind Singhal - University of Texas, USA
Prof. Dr. Asaf Varol - Firat University, Turkey
Prof. Dr. Aytekin İşman - Sakarya University, Turkey
Prof. Dr. Brent G. Wilson - University of Colorado at Denver, USA
Prof. Dr. Buke Akkoyunlu - Hacettepe University, Turkey
Prof. Dr. Cengiz Hakan Aydin - Anadolu University, Turkey
Prof. Dr. Chang-Shing Lee - National University of Tainan, Taiwan
Prof. Dr. Charlotte N. (Lani) Gunawardena - University of New Mexico, USA
Prof. Dr. Chi - Jui Lien - National Taipei University of Education, Taiwan
Prof. Dr. Chih - Kai Chang - National University of Taiwan, Taiwan
Prof. Dr. Chin-Min Hsiung - National pingtung university, Taiwan
Prof. Dr. Colin Latchem - Open Learning Consultant, Australia
Prof. Dr. Colleen Sexton - Governor State University, USA
Prof. Dr. Demetrios G. Sampson - University of Piraeus, Greece
Prof. Dr. Dimitar G. Velev - University of National and World Economy, Bulgaria
Prof. Dr. Don M. Flourney - Ohio University, USA
Prof. Dr. Dong Sik Kim - Hanyang University, South Korea
Prof. Dr. Enver Tahir Raza - Doku Eylül University, Turkey
Prof. Dr. Erarp Altun - Ege University, Turkey
Prof. Dr. Feng-chiao Chung - National pingtung university, Taiwan
Prof. Dr. Ferhan Odabaşı - Anadolu University, Turkey
Prof. Dr. Finland Cheng - National pingtung university, Taiwan
Prof. Dr. Fong Soon Fook - Universiti Sains Malaysia, Malaysia
Prof. Dr. Francine Shuchet Shaw - New York University, USA
Prof. Dr. Gianni Viardo Vercelli - University of Genova, Italy
Prof. Dr. Gwo - Dong Chen - National Central University Chung - Li, Taiwan
Prof. Dr. Hafize Keser - Ankara University, Turkey
Prof. Dr. Halil İbrahim Yalın - Gazi University, Turkey
Prof. Dr. Heli Ruokamo - University of Lapland, Finland
Prof. Dr. Henry H.H. Chen - National pingtung university, Taiwan
Prof. Dr. Ing. Giovanni Adorni - University of Genova, Italy
Prof. Dr. J. Ana Donaldson - AECT President
Prof. Dr. J. Michael Spector - University of North Texas, USA
Prof. Dr. Jerry Willis - St. John Fisher University in Rochester, USA
Prof. Dr. Jie-Chi Yang - National central university, Taiwan
Prof. Dr. Kinshtuk - Athabasca University, Canada
Prof. Dr. Kiyoshi Nakabayashi - Chiba Institute of Technology, Japan
Prof. Dr. Kumiko Aoki - The Open University of Japan, Japan

Copyright © The Turkish Online Journal of Educational Technology
Prof.Dr. Kuo - En Chang - National Taiwan Normal University, Taiwan
Prof.Dr. Kuo - Hung Tseng - Meiho Institute of Technology, Taiwan
Prof.Dr. Kuo - Robert Lai - Yuan - Ze University, Taiwan
Prof.Dr. Liu Meifeng - Beijing Normal University, China
Prof.Dr. Marina Stock Meissac - Arizona State University, USA
Prof.Dr. Mehmet Ali Dikermen - Middlesex University, UK
Prof.Dr. Mehmet Çağlar - Near East University, TRNC
Prof.Dr. Mehmet Gürol - Firat University, Turkey
Prof.Dr. Mehmet Kesim - Anadolu University, Turkey
Prof.Dr. Mei-Mei Chang - National Pingtung University, Taiwan
Prof.Dr. Melissa Hu-Mei Fan - National central university, Taiwan
Prof.Dr. Min Jou - National Taiwan Normal University, Taiwan
Prof.Dr. Ming - Pui Chen - National Taiwan Normal University, Taiwan
Prof.Dr. Murat Barkan - Yaşar University, Turkey
Prof.Dr. Mustafa Murat Inceoğlu - Ege University, Turkey
Prof.Dr. Mustafa Şahnı Dündar - Sakarya University, Turkey
Prof.Dr. Nabi Bux Junani - International Islamic University, Pakistan
Prof.Dr. Nian - Shing Chen - National Sun Yat - Sen University, Taiwan
Prof.Dr. Paul Gibbs - Middlesex University, UK
Prof.Dr. Petek Aşkar - Hacettepe University, Turkey
Prof.Dr. Ramdane Youmsi - Ecole polytechnique de Montreal, Canada
Prof.Dr. Rafi Yıldız - Çanakkale 19 Mart University, Turkey
Prof.Dr. Roger Hartley - University of Leeds, UK
Prof.Dr. Rozhan Hj. Mohammed Idrus - Universiti Sains Malaysia, Malaysia
Prof.Dr. Saedeh Siraj - University of Malaya, Malaysia
Prof.Dr. Sello Mokoena - University of South Africa, South Africa
Prof.Dr. Servet Bayram - Yeditepe University, Turkey
Prof.Dr. Shan - Ju Lin - National Taiwan University, Taiwan
Prof.Dr. Sheng Quan Yu - Beijing Normal University, China
Prof.Dr. Shi-Jer Lou - National Pingtung University, Taiwan
Prof.Dr. Shu - Sheng Liaw - China Medical University, Taiwan
Prof.Dr. Shu-Hsuan Chang - National Changhua University of Education, Taiwan
Prof.Dr. Stefan Aufenanger - University of Mainz, Germany
Prof.Dr. Stephen Harmon - Georgia State University, USA
Prof.Dr. Stephen J.H. Yang - National Central University, Taiwan
Prof.Dr. Sun Fuwan - China Open University, China
Prof.Dr. Sunny S.J. Lin - National Chiao Tung University, Taiwan
Prof.Dr. Teresa Franklin - Ohio University, USA
Prof.Dr. Toshio Okamoto - University of Electro - Communications, Japan
Prof.Dr. Toshiyuki Yamamoto - Japan
Prof.Dr. Tzu - Chien Liu - National Central University, Taiwan
Prof.Dr. Uğur Demiray - Anadolu University, Turkey
Prof.Dr. Ülüm Köymen - Lefke European University, TRNC
Prof.Dr. Vaseudev D.Kulkarni - Hutatma Rajguru College, Rajgurunagar(Pune),(M.S.) INDIA
Prof.Dr. Xibin Han - Tsinghua University, China
Prof.Dr. Yan Hon Keung - City University of Hong Kong, Ilong Kong
Prof.Dr. Yavuz Akpinar - Boğaziçi University, Turkey
Prof.Dr. Yen-Hei-Sung Chu - National central university, Taiwan
Prof.Dr. Yuan - Chen Liu - National Taipei University of Education, Taiwan
Prof.Dr. Yuan-Kuang Guu - National pingtung university, Taiwan
Prof.Dr. Young-Kyung Min - University of Washington, USA

Assoc.Prof.Dr. Abdullah Kuzu - Anadolu University, Turkey
Assoc.Prof.Dr. Adile Aşkim Kurt - Anadolu University, Turkey
Assoc.Prof.Dr. Ahmet Eskiçumali – Sakarya University
Assoc.Prof.Dr. Aijaz Ahmed Gujar - Sindh Madressatul Islam University, Pakistan
Assoc.Prof.Dr. Aytaç Göğüş - Sabancı University, Turkey
Assoc.Prof.Dr. Chen - Chung Liu - National Central University, Taiwan
Assoc.Prof.Dr. Cheng - Huang Yen - National Open University, Taiwan
Assoc.Prof.Dr. Ching - Fan Chen - Tamkang University, Taiwan

Copyright © The Turkish Online Journal of Educational Technology
Table of Contents

A Study On The Relationship Between Eq And Computer Game Addiction Of Secondary School Students
Ülkü TOSUN, Alime TOPŠAR

1

A Case Study On The Effects Of Teacher-Structured Out-Of-Class Ict Activities On Listening Skills, Motivation And Self-Efficacy
Ayşe GÖRGÜN

8

Oya ABACI

20

A Computerized Corpus Analysis Of The Use Of Pragmatic Markers In Ktucale And Bawe
Tuncer AYDEMIR, Ali Şükri OZBAY

25

A Content Analysis Of Studies Devoted To Physical Sciences Education At Primary School Level
Murat GENÇ

31

A Different Method Proposal To improve Of Skills And Success Of The Subtraction At Primary Schools In Turkey
Engin CAN

38

A Field Research For Profile Evaluation Of Mechanical Engineering Students
Billur KANER

44

A Pedagogical Analysis Of Ulvi Cemal Erkin’s Impressions “Duyuşlar”
M. Nevra KUPANA

50

A Phenomenological Study To Fugure Out The Making Abstract Painting
Yasemin ARIMAN

56

A Qualitative Study On The Educational Beliefs Of Preservice Teachers
Ahmet ESKİCUMALI, Zeynep DEMİRTAŞ, Serhat ARSLAN, Elif Nur UZUN

61

A Research On Institutional Social Responsibility Projects Executed In The Matter Of Education
Gülşan ÇALIŞIR

68

A Research On The Contribution Of Primary And Secondary Education To Human Rights Consciousness Level Of High Scool Graduates In Turkey
Gülten GÖK

79

A Study Of Augmented Reality Technology Acceptance In Nursing College
Ziwapon CHAROENWONG, Sunchi PUTTHANASITH

95

A Study Of Gifted Students’ Motivation For Achievement In Mathematics
Yasemin DERİNGÖL

101

A Study On Awareness And Demands Of Parents Concerning Career And Vocational Education Of Special-Classes In Middle And High Schools
Soonyoung HWANG, Hoohlee LEE

107

A Study On Teacher Motivation Levels Based On Intrinsic And Extrinsic Motivation Factors
Necmi GÖKYER

112

Copyright © The Turkish Online Journal of Educational Technology
A Study On The Environmental Perception And Knowledge Levels Of Pre Service Science Teachers According To Their Class Level
E.Berna GÜÇÛ, Seren ERTEN

A Study On The Relationship Between Conflict Resolution Behaviors & Empathy Levels Of University Students
Ülker TOSUN, Celal GÜLŞEN, Yadigar KOCAMA, Ayşenur CUCI

A Study On The Relationship Between Internet Addiction And Cyberbullying Sensibility Of Psychological Counselor Candidates
Cengiz SAHIN

A Study Requirements The Use Of Smart Innovation System For Teaching And Learning To Develop Creativity Of Undergraduates.
Sırıkan CHAIYASIT, Narong SOMPONG, Punyarat PUNYA

A Task Development Process: The Case Of Fourth Grade Introduction To Matter Unit
Gökşen ÜÇÜNÇU, Gönül SAKIZ, Sefer ADA

A Technology-Based Speaking Practice To Elt Algerian Students: Pedagogical Implications
Faiza HADHAM

Activisation Of The Unemployed In The Light Of Personalism – Evaluation Attempt
Magdalena LUKA

Adaptation A Scale For Teachers’ Perceptions Of The Applications Of Scientific Process Skills: A Study Of Validity And Reliability
Mehiap YİLDİRİM, Hikmet SÜRMELİ, Ilknur GÜVEN, Mustafa ERGUN

Addiction Or Addition: Facebook Use Among Efl Students
Mustafa Naci KAYAÇOLU

Administering Problem-Based Learning (Pbl) Approach In The Teaching Of College-Level Mathematics
Sau Herng HAN, Masitah SHAHRILL, Abby TAN, Khairul Aminin TENGAH, Jainatul Halida JAIDIN, Rosmawijah JAWAWI

Administration Model For Education Executives In Private Schools And Teachers’ Perception In This Sense
Celal GÜLŞEN, Derya Ülhatun BOZKURT

Adopting Proper Methods For Studying Management In Post-Transformation Economies And Their Effect On The Employment Rate
Irena MIKOVA, Pavel PUDIL, Lenka KOMARKOVA

Alternative Higher Education In Precarious Conditions: The Case Of Ceyus-Cide
Jainne JIMÉNEZ

Ambidexterity Learning Process For Exploration And Exploitation: A Model Of Hybrid Ambidextrous University
Retro KUSUMASTUTI, Nurul SAFITRI, Nur FIRDAUS, Milla Septiana SETYOWATI, Eko SAKAPURNAMA, Prima NURITA

An Analysis Of The Relationship Between Curiosity And Self-Directed Learning Skills Of Teacher Candidates
İlker AŞKIN TEKKOL, Melik DEMİREL

An investigation Of Physics Education Doctoral Dissertations Made In Turkey Between 2010 And 2015
Ali ÇETİN
An Investigation On Preservice Science Teachers’ Usage Social Media For Educational Purposes: Implications For Teacher
Hunkar KORKMAZ, Ahmet ALTINDAĞ

An Overview Of The Reports Belongs To Foreign Countries’ Education Systems And Their Contents Which Guided The Education In The Republican Period (1925-1927)
Savaş KARAGÖZ

Analysing The Factors Affecting Student Achievement In E-Learning Education
Eşer GEMİKONAKLI, Tolgay KARANFİLLER

Analysis Of The Attitudes Of Pre-Service Science Teachers On Renewable Energy Sources
Mustafa UĞRAŞ, Şeyma AKSAKAL

Analysis Of Views About Constructivist Learning In International Studies
Gürbüz OCAK, İfet OCAK, Serkan BOYRAZ

Analyzing The Relationship Between The Secondary School Students’ Attitudes Towards The Educational Computer Games, And Their Reflective Thinking Skills
Mustafa KAHYAOGLU, Mithat ELÇİÇEK

Antecedents Of Trait Aggressiveness Among Sports Students
Lucia MONACIS, Silvana MICELI, Antonio ANTEFERMO, Davide Giuseppe PEPE

Application Of Complexometric Titration Of Bismuth Subnitrate In The Ingredient Whitening Skins Cosmetics
Chanayapat SANGSUYON

Appraising The Innovation Week Paradigm In Line With Malaysian Ministry Of Higher Education Blueprint
Muher Fouad SFEIN, Daw Khin Saw NAING, Aza SHREEN, Zainal Arifin MUSTAPHA, Kamarudin D. MUDIN

Are Kazakhstani Schools Ready For Trilingual Education?
Madina ASHRIMBELTOVA

Assessing Presence Of Institutions Of Vocational Education As Factor Contributing To Economic Activity In Small Municipalities
Viktorija ŠIPILOVA, Elita JERMOLAJJEVA, Inta OSTROVSKA, Ludmila ALEKSEJEVA, Dmitrijs OLEHNOVIČS

Attitudes Of Candidate Teachers In The Modern Education System Towards The Computer Technology Lesson
Emete GERÇEL, Mehmet ÇAĞLAR, Azmiye YINAL

Attitudes Of Preservice Instructional Designers Towards Online Collaborative Learning
Oğuzhan ÖzDEMİR, Pınar ERTEN, İbrahim Yaşar KAZU

Attitudes Towards Mathematics And Music Of Fourth Grade Students
Nihan SAHINKAYA, Deniz TUNCER

Being A Good Parent - Views Of Czech Parents Of Home Preparation Of Pupils At The Beginning Of School Attendance
Jana MAJERČÍKOVÁ, Barbora PETRŮ PUHROVÁ, Romana DIVOŠOVÁ

Benefits Of Supporting Students In Mathematics And Statistics: Evidence From The Czech Republic
Marketa MATULOVA
Beyond The Horizon: Learning Arising From The Use Of Twitter By Schools In New Zealand
Hazel BEADLE

Biomusic Body, Sound And Learning
Laura RIO, Emilia SICA, Filippo GOMEZ PALOMA

Blended Learning – How To Create An Effective Course
Keith BUCKLEY

Brazilian Curricular Policy: Challenges For The Future
Adriana Almeida Sales de MELO

Building Bridges: Enabling Intercultural Competences Within Double Degree Programs
Fabio CORNO, Richa LAL, Silvia HASSOUNA

Building Bridges: Enabling Intercultural Competences Within Double Degree Programs
Fabio CORNO, Richa LAL, Silvia HASSOUNA

Challenge Learning Strategies For Business Statistics
Somruay APICHATIBUTARAPONG

Changing Shopping Methods In Technology Era: A Study Of'Diesre.Com' Web Site From Turkey
Tuğçe BORAN

Characteristics Of Colours, Interior Design And Their Psychological And Physiological Effects
Nurcan GÖKÇAKAN ÇİÇEK, Kaan GÖKÇAKAN

Children'S Agency. New Perspectives On Weekly Outdoor Days In German Primary Schools
Sarah SAHRAKHIZ, Christian ARMBRUSTER, Robert GRÄFE, Marius HARRING, Matthias D. WITTE

Children’s Bilingualism And Language Delay: A Literature Review
Georgios MOUTSINAS

“Cinema And Therapies”. Employing Movies To Improve Basic Skills In Pharmacy Students
Juan TOLOSA, Carlos ALONSO-MORENO, Antonio Juan BARBERO, María del Mar ARROYO-JIMÉNEZ

Civility Levels Of The Teaching Staff Of The Faculty Of Education
Rüştü YEŞİL

Classification Of Expenses In Income Statement: Is There Any Difference Between Nature And Function From The Students’ Point Of View?
David PROCHÁZKA

Classroom Management And Inclusion: Pedagogical And Technological Approach
Maria Concetta CARRUBA

Comparing Higher Educational Students Levels On Educational Stress Management
Cengiz ŞİMŞEK, Besra TAŞ, Celal GÜLSEN, Muzaffer SAYRAN, Y. Emre DURMUŞ

Comparing The Mathematical Thinking Experiences Of Students At Faculty Of Education And Faculty Of Arts And Sciences
Cemalettin YILDIZ

Comparison Of The Trends In Higher Education In The Czech Republic, Slovakia And Austria
Martina KUNCIOVA, Petr MULAC

Comparison On The Perception On The Direction Of Education Communities In Korea
According To Factors Related To Special Educators
Soonyoung HWANG, Eunhwa LEE, Hoohee LEE
Computer Science Students’ Attitudes
Piroska BIRÓ, Mária CSERNOCH

Computerized Assessment Of The Annual Grade Points Of Secondary School Seventh Grade Students In The Course Of Algebra
Novruz BASHIROV, Ali Riza KUL, Aynura ALEKBEROVA, Azadxan ADIGOZELOV

Confirmatory Factor Analysis Of The Ka-Si Empathic Tendency Scale Adolescent Form In Religious High School Students
Ertaşrul ŞAHİN, Nursel TOPKAYA

Contextualized Science Teaching: The Contribution Of Photographs Included In School Science Textbooks
Laurinda LEITE, Sofia MORGADO, Luis DOURADO

Contribution Of Visual Thinking On Linear Development Of Preschool Children Group In Visual Arts Education Lessons
Vesile AYKAÇ

Contributions Of Differential Calculus In The Understanding Of Financial Formulas Through An Interactive Learning Object
Juan ARANGO, Diana GAVIRA Rodríguez, Alejandro VALENCIA Arias, Carlos ORTEGA Rejas

Contributions Of The “Theme” Course In French Learning As A Foreign Language: Case Of The Department Of Ffl Of A Turkish University
Fatma KAZANOĞLU

Course Supervisions Carried Out By Educational inspectors And School Managers
Şenyurt YENİPINAR, Sibleyman GÖKSOY

Current Trends In Social Media Research In Higher Education: An Analysis Of Master Theses And Ph.D. Dissertations In Turkey
Dilek Melike ULUÇAY, Kadriye UZUN

Cynicism In Organizations And Personal Stress Perception: A Correlational Screening Research
Esef Hakan TOYTOY, Eda ÇELEPÇIKAY

Department Of Computer And Instructional Technology Teacher Education Opinions Of Candidate Teachers On Education Models
Mithat ELİÇEK, Mustafa KAHYAOGLU

Designation And Qualification Of Victims Of Local News Story In Turkish Daily Written Press: Exemple Of Milliyet
Havva ÖZÇELEBİ

Designing Animations And Simulations For The Teaching Of Complex information: A Practitioner’S Perspective
George HATSIDIMITRIS, Jeremy BAILEY, Lucyna KEDZIORA-CHUDCZER

Determination Of Geometry Self-Sufficiency Of 5th, 6th, 7th And 8th Grade Students Having Impaired Hearing
Kenan ÇAĞLIYAN, Gülay KORU YÜCEKAYA, Ayşe ALTIN

Developing A Scale To Evaluate Teaching And Learning Situations In Secondary School Curricula
İlkal OCAK, Serkan BOYRAZ

Developing A Teacher Characteristics Scale
Hüseyin YARATAN, Emre MUEZZIN

Copyright © The Turkish Online Journal of Educational Technology
Developing An Evidenced Chiropractic Curriculum
Stephney WHILLIER

Developing Multicultural Education Program From Middle School Curriculum In Korea
Kyomin NAM, Ayoung KIM, Hong Soo KIM

Developing Personnel Competencies In Explosive Atmospheres For Electrical Engineers
Tsung-Chih WU

Developing Talna: A Numeracy Learning Application For Children With Autism
Muhamad Fairus KAMARUZAMAN, Harrinni Md NOOR, Mustaffa Halabi Haji AZAHARI

Development Model Of integrated Iet Learning Package By Using Personal Knowledge Management To Enhance Learners’ 21St Century Skills
Nattaphon RAMPAI

Development Of A Research Competence In University Students Through Blended Learning
Lagunes AGUSTIN, Judikis Juan CARLOS, Flores Maria ALICIA

Development Of Conceptual Understanding Of Acid-Base By Using Inquiry Experiments In Conjunction With Particulate Animations For Grade 8 Students
Sakrit SUPASORN, Maliwan AMATATONGCHAI

Development Of Scale Of Attitude About Social Studies Class, Citizenship, Human Rights, Respect For Diversity And Tolerance Issues For Middle School Students
Murat TEKIROĞLU

Development Of Student Team Competences With Potential To Be Utilized in Practise
R. ČOČKOVÁ, O. JURÁŠKOVÁ

Development Of Support Strategies For Students With Disabilities Through The Swot Analysis: A Case Study Of The Center For Students With Disabilities At The P University In Korea
Jakyung KIM, Sungwook JANG, Bohee SHIN

Development Of The Success Rate In Mathematics 1 At The College Of Polytechnics Jihlava (Czech Republic) In 2006–2015
Martina ZÁMKOVÁ, Martin PROKOP, Radek STOLÍN

Digital Games As A Method For E-Learning: Example Of Scratch.Mit.Edu
Berkay BULUŞ, Aytekin İŞMAN, Ahmet ESKİCÜMALI

Dimensions Of The Communication Through Facebook: Anadolu University Official Facebook Page
Medika SAĞLIK TERLEMEZ

Discriminant Analysis As A Tool For Analysing Student’S Preferences Choosing Online Or Traditional Course For A Repeated Exam
Bognár LÁSZLÓ

Discussion On The Prospective Teachers' Understanding Level Of Electric Charge
Ali YILDIZ

Distance Training In Special Education: Participants’ Attitudes And Preferences
Elena CHRONOPOULOU, Konstantinos PAPADOPOULOS

E-Teaching Strategies: Massive Versus Customized Methodologies
Stephen John BEAUMONT

Education Barriers For Czech Adults
Jan KALENDA
Education Channels In Video Sharing Websites: Case Of Youtube Turkey
Serap ÖZTÜRK

Education Of Alzheimer's Patient's Family
Zucana BACHRATA, Jarmila KRISTOVÁ

Education Rights Of Minorities In North Cyprus
Ali DAYIOĞLU

Educational And Scientific Conferences: An Additional Activity For Undergraduate Students Of Pharmacy
Antonio J. BARBERO, Juan TOLOSA, Carlos ALONSO-MORENO, M. Mar ARROYO

Effect Of Information Technologies (It) Pre-Service Teachers’ Learning Approaches On Their Attitude Towards Programing
Mustafa YAĞCI

Effect Of Social Media Usage On University Students In An Emerging Country
Melissa W. MIGIN, Mohammad FALAHAT

Effect Of The Use Of Technology In Mathematics Course On Attitude: A Meta Analysis Study
Baki ŞAHİN

Effective Project Management For Creative Europe
Eva SVIRAKOVA

Effectiveness Of Internship Practices By Students Of Medical Services Vocational Schools Of Higher Education
Nurhan GUMRÜKÇÜOĞLU

Effects Of An Integrated Approach Program For The Korean Alphabet Learning Of Children With Reading Disability
Kiju KIM,Jakyoung KIM, Sungwook JANG

Effects Of Discovery Learning And Student Assessment On Academic Success
Nilgün SUPHI, Hüseyin YARATAN

Efficiency And Tendency Of The Educational Computer Games In Education- A Document Review
Mustafa YAĞCI

Elearning Courseware Development With Project-Based Blended Learning For Enhancing Teachers’ ICT Skills
Narong SOMPONG, Nattaphon RAMPAI, Yaowaluk PIPATJUMROENKUL

Electronic Waste: The Social And Environmental Importance Of Thai Teenager Consumer Awareness
Thanyaluck YIMYONG, Thepparat PHIMOLSATHIEN, Wanno FONGSUWAN

Elementary School Students’ Opinions About Music Lessons And The Songs In The Music Books
Sahabat BURAK

Emotional Intelligence, Social Competence, And The Participation In Pop Culture Of Polish Students During Adolescence
Kamil KURACKI

Endorsement Of New Ecological Paradigm: A Comparison Of Provincial And Urban Samples
Bahattin Deniz ALTUNOĞLU

Copyright © The Turkish Online Journal of Educational Technology
Engaging Interactive Words Pronunciation Recognition System For Language Studies
Noraini SEMAN, Nursuriati JAMIL, Norizah ARDI

Engineering Education - Status Quo In Austria In Comparison With The Academic Field Of Business Education
Sabrina Romina SORKO, Wolfram IRSA

Entrepreneurship Education And Learning As A Model For Regional And International Cooperation On Youth Employment In The Mena Region
Bassou El MANSOUR, Suleiman A. SULIEMAN

European Higher Education Area With The Eyes Of Students Of Ural Federal University
Olga BOGATYREVA, Natalia LESKINA

Evaluation Of Pre-Service Teachers' Attitudes Against Chemistry Laboratory According To Some Demographic Variables
Fatma Gülay KIRBAŞLAR, Alpin VEYISOĞLU, Zeliha ÖZSOY-GÜNEŞ

Evaluation Of Teaching And Learning Situations In Biology Curriculum According To Teacher Opinions
İftal OCAK, Serkan BOYRAZ

Evaluation Of The New Math Curriculum Implemented In High Schools By Views Of Teachers And Students In Secondary Education
Mustafa ÇEVİK, Cihat ABİDOĞLU

Evolving Interest In Using An Informal Learning Space For Formal Teaching
Alan L. STEELE, Cheryl SCHRAMM, Peter RICKETTS

Examination Of The Anxiety Levels Of Visually Impaired Elite Futsal Players
Barsı KARAOĞLU, Yahya POLAT

Examination Of The Relationship Between Branches Of Sports Science Faculty Students And Their Problem Solving Skills
Nuri KARABULUT, Muhammet ÖZER, Mihray MUSA, Bahar ALP

Examining Of Mathematics Teachers And Teacher Candidates' Pedagogical Content Knowledge Regarding The Algebra Within The Context Of Students' Answers
Seval Deniz KILIÇ

Examining Social Studies Teacher Candidates' Views On Habit Of Reading Books About Political Issues Based On Different Variables
Öğe TARHAN, Deniz COŞKUN

Examining The Implementation Of Inclusive Education And Special Educational Support Services For Students With Hearing Loss In Turkey
Marat DOĞAN, Hasan GÜRGÜR

Examining The Problem Types In Middle School Mathematics Textbooks In The Context Of Presentation, Content And Solution
Cemalettin Yıldız, Mihriban HACİSALIHOĞLU KARADENİZ

Experiential Education In Undergraduate Teacher Training And Its Influence On The Classroom Climate
Renata OROZOVA, Andrea KLÍMKOVA

Exploring Midwives' Knowledge About Myelomeningocele In North Western Indonesia
Siahuan AMP, Lumbaranja SN

Copyright © The Turkish Online Journal of Educational Technology
Exploring Secondary School Teachers’ Constructivist Beliefs Using Talis 2013
Puthachat ANGNAKOOK, Jeff M. ALLEN

Exploring The Role Of Academic Heads In Maintaining The Quality Of Teaching And Learning Within Their Departments: A Case Study Of A Private University
Annyza TUMAR, Soaib ASIMIRAN, Zaidatul Akmaliah Lope PHIE, Ismi Arif ISMAIL

Factor Affecting Creative Problem Solving Performance Of Pre-Service Teachers In Blended Learning Environment
Samoekan SOPHONHIRANRAK, Praweena SUWANNATTATHACHOTE, Songworn NGUDGRATOKE

Factors Impacting The Promotion Of Instructional Design And In Formation Literacy Skill In Thai Teacher
Sumalee CHUACHAI, Onjaree NATAKUATOONG, Wiriyai SWEGNGAM

Faith Under Project Determination Of Scale Development Of Teachers ‘Readiness Levels: Sakarya National Education Directorate Example
Metin ÇENGEŁ, Ayşe ALKAN

Fourth Grade Students’ Metaphoric Perceptions About Mathematics And Music
Deniz TUNCER, Nihan SAHINKAYA

From Moocs To Toocs Small Sized Learning For Everyone
Willi BERNHARD, Nicole BITTEL

Fuzzy Detecting The Effect Of Mobile Game-Based Learning For University Students
Yu-Lan HUANG, Dian-Fu CHANG

Galileo Galilei’s Location, Shape And Size Of Dante’s Inferno: An Artistic And Educational Project
Paola MAGNAGHI-DELFINO, Tullia NORANDO

Generating Online Course In Distance Learning The importance Of Design Process
Kübra YÜZÜNCÜYIL

Guided Group Project Approach For An Engineering Technology Course: Performance And Learning Outcomes
Cheer-Ming CHAN, Alina SHAMSUDDIN, Azeanita SURATKON

Gustav, Web Tool For Software Development Time Estimation
Veronika VESEĽÁ, Petr ŠILHAVÝ, Tomáš URBÁNEK

Heinrich Rombach’s Structural Pedagogy And How Technology Can Help To Transform The School System In A School Structure
Michaela MÜNSTERER

High School Students’ Views About Process Oriented Guided Inquiry Learning (Pogil)
Şenol ŞEN, Ayhan YILMAZ, Ömer GEBAN

How Adults Have Spatial-Temporal Flexibility Experiences Through Learning Technologies
Nurcan TORENLI, Murat CINAR

How To Embrace The New Challenges Of Education? The Use Of An Innovative Methodology In The Teaching-Learning Process, In The In The Assessment And In The Relation Teacher-Student Vs. Student-Teacher Based On The Simulator Of Business Environment Technology
Susana Adelina Moreira Carvalho BASTOS, Liliana Fernanda Moreira Carvalho Bastos AZEVEDO, Helena Maria Santos de OLIVEIRA

Copyright © The Turkish Online Journal of Educational Technology
Identification Of The Critical Factors Of The Process Of Innovation Transfer At Universities In The Czech Republic
Radomila SOUKALOVÁ

Identifying Of Appropriate Topics In Media Coverage For Enhancing Earthquake Survival Skills Of Undergraduate Students
Tatsanawalai UTARASAKUL

Identity Styles And Internet-Related Addictive Behaviors In Adolescents
Maria SINATRA, Valeria DE PALO, Paolo CONTINI, Vito VOLPICELLA

Impact Of Missing Data On Rasch Model Estimations
Sümeysa SOYSA, Çiğdem Akın ARIKAN, Hatice INAL

Impact Of The Demographics On Academic Achievement In Architecture Education
İlizes SELKAL SEZER, Dilek MURAT, Yasemin ERBIL

Implementation Of Tax Education On Elementary School Students As An Effort To Raise Tax Awareness In Directorate General Of Taxes Regional Office For West Java I
Anita Setia WINARTI, Milla Sephitana SETYOWATI

Implementing Didactic Measuring Technology Joined With Inquriry Approach – A Way To Enhance Students Understanding Of Photosynthesis.
Ryplova RENÁTA, Čekal TOMAS

Importance Of Ethical Principles In Advertising And Board Of Advertisement’S Function As A Method Of Administrative Control
Abdullah ÖZKAN

Influences Of Physics Education Supported By Computer Simulations On Motivation Levels And Teaching Strategies Of Teacher Candidates
Mustafa KAHTAOĞLU, Veysel ÇELİK

Innovative Teaching In Higher Education: The Big Data Approach
Miftachul HUDA, Muhammad ANSHARI, Mohammad Nabil ALMUNAWAR, Masitah SHAHRILL, Abby TAN, Jainatul Halida JAHIDIN, Sabrina DAUD, Masaairol MASRI

Integrating Responsible Research And Innovation In Primary School Project-Based Learning - The “Lotus Effect” Activity
Gabriela Alina ANGHEL, Gabriell GORGHIU

Intellectual Structure Of Stem Education In Educational Research
Mitha Takesin UŞTUNDAŞ, Haydar YALÇIN, Erhan GÜNEŞ

Inter-Cultural Professional Competence As A Key Aspect Of Translators Training
Leila Yu. MIRZOYeva, Aigul K. ZHUMABEKOVA

Intercultural Awareness Of Czech Students At Secondary Schools
Lucie CVIKLOVA

Intercultural Competency Skills Of International College Students Of A Thailand Public University
Keow Ngang TANG, La-orrr I SANOAMUANG

Interdisciplinary Approach In Foreign Language Teaching: Use Of Video Material In Forming Cultural Competence Of International Relations Students
Natalia KUZMINYKH, Ksenia Tabarintseva ROMANOVA

Copyright © The Turkish Online Journal of Educational Technology
International Accreditation Of The Main Educational Program As Possibility Of Opening The New Educational Horizons
Loginova I.O., Volkova O.V., Andrejeva J.Y., Serduk T.I., Kononenko I.O.

Interpretations Of The Concept Of Probability: An Introduction
Paolo Di SIA

Intimate Partner Violence: Social Support And Coming Out
Garro MARIA, Cirami FEDERICA, Elena Ayllón ALONSO

Intrapsychical Factor Influence On The Rationality Of Thought
Andrea JUHÁSOVA

Investigating Preschool Teachers’ Use Of Information Technologies In Terms Of Special Field Competences
Fatma Elif KILINC, Gudezur Sule TEPETAS CENIGIZ

Investigating The Anatomy Education Self-Efficacy Beliefs Of The Students Of Biomedical Instrument Technology Program
Tuncay ÇOLAK, İsmail SİVRL, Mehmet Deniz YENER, Dilşad GÜZELORDU, Rabia TASDEMİR, Elif AKSU, Belgin BAMAÇ, Serap ÇOLAK

Investigating The Attitudes Of Pre-Service Psychological Counseling And Guidance Teachers Towards The Preparation Process Of Individualized Educational Program
Tamer AYDEMİR, Tolga ÇOSGUNER

Investigation Of Academic Procrastination And Academic Self-Efficacy Of Physical Education And Sport Teacher Candidates In Term Of Some Variables
Zehra CERTEL, Ziya BAHADIR, M. Levent ÖZGÖNÜL

Investigation Of Attitude Towards The Computer Game Of Middle Schools Students
Ayşe ALKAN, Metin ÇENGEL

Investigation Of Being A Cyber Bully And Victim In Adolescents According To Demographic Variables
Mehmet ŞAM, Erdinç DURU

Investigation Of General And School Life Satisfacton Of Adolescents With Different Academic Success Level
Tuncay ORAL

Investigation Of Relationship Between Just World Perceptions (Belief In A Just World) And Decision Making Process Of Students At The School Of Physical Education And Sports
Gökhan ACAR, Mhiray MUSA, Ahmet SAHİN, Nuri KARABULUT, Nigar YAMAN, Muhammet OZER

Investigation Of Techno-Stress Levels Of Teachers Who Were Included In Technology Integration Processes
Ahmet Naci ÇOKLAR, Erkan EFLİTİ, Yusuf Levent ŞAHİN, Arif AKÇAY

Investigation Of The Attitudes Of College Students Towards Dating Violence According To Demographic Variables
Ebubekir ÖZDEMİR, Erdinç DURU

Investigation Of The Perceptions Of Self-Efficacy Of Secondary School Students With Different Levels Of Friend, Family And Teacher Social Support
Tuncay ORAL

Investigation Of The Reading Habits And Interests Of The Elt Students Who Study At Atatürk University: A Case Study
Furkan CANBAY

Copyright © The Turkish Online Journal of Educational Technology
It Competition From The Students’ Perspective: Their Motivation And Attitudes Toward Success
Nikolina BUBICA, Ivica BOLJAT

Just Ask! What Prompts Elementary School Students To Engage In Critical Thinking In Reading And Mathematics Classes In The United States?
Robert G. CRONINGER, Rachel M. V. CRONINGER

Language Development Of Children Aged 18 To 36 Months According To Butzkamm
Mihriban CAF

Copyright © The Turkish Online Journal of Educational Technology
It Competition From The Students’ Perspective: Their Motivation And Attitudes Toward Success

Nikolina BUBICA  
Mokosica Elementary School, Croatia  
nikolina.bubica@du.t-com.hr

Ivica BOLJAT  
Natural Science Faculty, Split, Croatia  
boljat@pmfst.hr

ABSTRACT
In the Republic of Croatia primary and secondary schools students compete in IT categories such as solving problems in programming, knowing fundamental Computer Science concepts or individual software project development. This research aims to explore different student’s motivation to participate in IT competition and to plan and organize self-preparation for it. Impact of some factors like competitor’s gender, category of competition, preparing strategy, general feeling of satisfaction and so on achieving success in this IT competition was explored. Preliminary data, among other, suggests that students consider their mentors (teachers), the most important factor in preparing for competition. Also, students do not consider that this competition could bring them some prestige in school or society, but they have some intrinsic motivation to participate in competition and use all available resources, human or material, to achieve success.

INTRODUCTION
Computer science (Informatics) is one of the elective subjects in elementary schools in the Republic of Croatia, therefore it has a smaller number of students involved in the teaching process. In the curriculum of the elementary school elective subject Computer Science problem solving with programming is represented approximately with 10-15% of the total content, which is not enough to achieve the level of knowledge that is necessary for success in the IT competition, which is called Infokup in Croatia. Elementary and secondary school students can compete in IT categories such as:

- Solving problems with programming using programming languages like Python, Logo, C, C++, Pascal... (categories Algorithms, Logo)
- Knowing fundamental Computer Science concepts (category CS Fundamentals)
- Individual software project development (category Software development)

Programming competition is organized in three groups: Logo programming for students aged 11 to 14, Algorithms in Python/Pascal/C/C++ for students aged 11 to 14 and Algorithms in Python/Pascal/C/C++ for students aged 15 to 18. CS Fundamentals is a category dealing with knowledge of the fundamental computer science concepts such as computer hardware, data organization, storage, presentation and management, networks and so. Software development is a category for one student or group of students who design and develop their own software project. More information on this competition could be found on the competition’s website (http://infokup.hr, http://hsin.hr).

The specific research questions were:

- Is there a difference when preparing for competition between boys and girls?
- Is there a difference between competition categories competitors?
- How many students are satisfied with results of competition?
- Do students intend to compete in same categories in which they have competed up to now?
- Are there any relations between computer science competition categories and students’ competition in other topics?
- Is playing computer games on regular basis one of the important features of Infokup competitors?

RELATED WORK
Many research papers are dealing with the students’ motivation for learning computer science courses in particular initial programming. The results of these studies have suggested different motivation of students but...
also that students are coming with different previous knowledge of programming in the initial courses in computer science. Generally, competition and other boots are often studied for their ability to motivate students (Vivek Khera; 1993; Widmer C., 1998). The biggest challenge for teachers of computer science lies precisely in teaching a broad, diverse group of students who come with a variety of knowledge. For teacher it is very difficult to find an appropriate level of difficulty of teaching content for all students. If the level of presentation is too low some of the best students will be bored and will be demotivated to work.

Roberts (Roberts, 2000) conducted a very interesting study on strategies for encouraging individual achievement. In his research he used different strategies to maintain the enthusiasm of excellent students as well as provide additional/rewarding points for special invested effort. Other strategies included organizing volunteer programming contest. Research has shown that students who benefited from the existence of achievement awards, such as extra points on the course, often were able to accomplish amazing things. The existence of the competition had a positive impact on many students. Occupancy and energy of the competition influenced the students to the extent that all progressed faster. Here, as in any pedagogical technique, design of the contests and the prize as boost must also take into consideration the environment in which they are implemented. Some strategies are implemented better in smaller communities and schools, and some are better in major communities, but in both cases the implemented strategies have led to an increase in students’ motivation for learning selected educational content.

Steele (Steele, 2010) examined the ability of voluntary programming competition to motivate students in adopting generally demanding content programming. At the very beginning, students showed great interest in the competition but a small number of students actually signed up for the competition. It precisely indicated the incompatibility of the lack of prizes in any form with the high demands of competition for students. From the teachers’ perspective, the existence of competition during the course has become an extremely useful tool, especially for advanced students who often adopted learning materials before the end of the course. Voluntary programming competition, for such students proved to be a positive experience and became a regular thing.

Bowring (Bowring, 2008) suggests a new paradigm for high school programming competition that has changing and competitive philosophy but also the concept of the implementation of the competition. The new philosophy places emphasis on the quality of the process rather than the time limit for implementation. The quality of students’ work is estimated in its technical and artistic quality. The technical quality answers to the question of how well made solution satisfies the request, and the artistic quality refers to the subjective evaluation of the code itself, its readability and documentation, and the readability of other parts such as the output file. The new paradigm of competition highlights the entertainment aspect of the competition through the creation of an infrastructure that promotes team competition.

The historical roots of the current paradigm of competition can be found in close association of computer science with mathematics. The existence of accurate and often unique solutions is characteristic for mathematics which pushes the contestants in the race to seek the correct answer. In contrast, software solution of a problem often isn’t unique. Diversity of mathematical and software solutions embodies the record in the software life cycle. The life cycle software provides software solutions and implies that software solutions are an ongoing process. Students are taught how to meet the requirements, how to design a solution, and finally how to apply, test and troubleshoot, and eventually develop and maintain solutions.

Results of previous pilot study (Bubica, Mladenovic, & Boljat, 2014) showed that students with excellent school success invested more time to prepare for competition. Students with higher school success appreciated more working with their mentors than students with lower school success. Looking at the success from the gender perspective, girls are willing to invest more effort in preparation regardless of whether it is a stand-alone work or work with a mentor. Boys are more likely to participate in category Algorithms Basic next year (since 2014 this category has been changed to Algorithms Basic/Python/Pascal/C/C++, and since 2016 to Algorithms – Python/Pascal/C/C++). The research showed no other significant difference between genders. That study also dealt with the question of students’ satisfaction of achieved success. Younger aged students expressed great satisfaction with the achieved success while final grade students expressed dissatisfaction with their accomplishment. It could be questioned if it was because younger students cultivated more collaborative learning style and older students cultivated more competitive model, according to Grasha Riechmann model (Hruska-Reichmann, S. & Grasha, A. F., 1982). Result showed that students valued the success in this competition. Although it was expected that the prize for achieved success, expressed through the getting bonus points upon enrollment in secondary school, should be significant factor for retaining interest for competition, results didn’t confirm statistical relevance. Although it has been shown that students lost interest in the older grades, they were very confident in the selection of the competition category. If they decided to compete the next year, they would choose the same category. The claim proved to be statistically significant for both categories CS fundamentals and Algorithms.
**THE STUDY**

The basic idea of this study was to explore whether there is a correlation between success in this IT competition and factors such as competitor’s gender, category of competition, different ways of preparing, general feeling of satisfaction of achieved success, available human and material resources, playing games on regular basis and so on. The pilot study that was conducted earlier (Bubica, Mladenovic, & Boljat, 2014) on a sample of students who performed at the lowest (first) level of competition was a great help for planning this research.

**RESEARCH METHOD**

For the purpose of this research a two surveys were conducted among 85 elementary and 36 secondary school students (Figure 1, male=98, female=23) who participated in the regional or state IT competition during 2014. In order to gain their personal attitudes about the opinions, beliefs and behavior, students were given an online survey with the corresponding series of standardized questions. As a part of this study were collected data about attitudes and preparation modes of teachers who prepared students for the competition. These data were not subject of this investigation but will be the subject of future interest.

Research data were collected through online attitudes surveys which were created by one of the researchers, while data was collected by a student involved in this project. Each survey was composed of 21 questions and they differ in only two questions. Students filled questionnaire anonymously and voluntarily one month after the competition. This instrument was designed to investigate research questions. Chi-square test was used to compare groups of students. Chi-square test is non-parametric technique used for nominal data. All analyses were performed using PSPP 0.8.1.1.statistical software.

**FINDINGS**

Boys vs. girls

Previous studies of Computer Science Education (CSE), among other factors, often investigated the role of student’s gender in achieving success at the end of computer-related courses and those studies haven’t highlighted gender as a factor that is important for achieving it (Bubica & Boljat, 2014; Bubica N., 2014). However, the results of study indicated some differences between boys and girls who participated in this competition. The first difference is shown in the selection of competing categories, so boys are more likely than girls to compete in category Algorithms (programming with programming languages Python/C/C++/Pascal) then in category LOGO (Table 1, χ²=7,128, df=1, p=.008).

**Table 1:** Distribution of students by gender and competing in category Algorithms – Python/Pascal/C/C++

<table>
<thead>
<tr>
<th>Preparations for the competition are held in school</th>
<th>For the next competition (if I participate) I will …</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>prepare the same way</td>
<td>not prepare at all</td>
</tr>
<tr>
<td>No</td>
<td>Count</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Percentage</td>
<td>29,2%</td>
</tr>
<tr>
<td>Yes</td>
<td>Count</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Percentage</td>
<td>39,3%</td>
</tr>
</tbody>
</table>

Also, boys are more likely to be involved in some other open competitions like Honi (http://www.hsin.hr) or some form of winter or summer IT preparation camps (χ²=8,743, df=2, p=.013). Furthermore, it seems that boys were more ready than girls to individually explore additional web sites with demo examples and programming tasks (χ²=8,049, df=2, p=.018). Very interesting aspect for us in this research was to explore whether playing games regularly (playing some game every week) had some influence on competitors or their attitudes and behaviors. Results showed that boys are more likely than girls to regularly play a game weekly (Table 6, χ²=8,878, df=2, p=.012). More on playing games on regular basis will be discussed in later sections.

Preparing for competition

IT Infokup competition is very demanding and expects a lot of student’s effort in order to achieve success. The knowledge material which is required for the competition CS Fundamentals mostly consists of regular learning
Success in competition
It was already mentioned that this IT competition - Infokup, is very demanding for students, so it was interesting to see what motivates students to apply for it. The results showed that students mainly applied because it was their independent decision, but there are also students who participated on their teachers’, friends’ or even parents’ recommendations. Student’s intrinsic motivation to compete confirmed to be very important. Precisely, for the students who had some intrinsic motivation to participate in this competition results showed that they were more ready to look for and use any additional learning materials and solved examples ($\chi^2 = 14.646, df = 2, p = .001$). They were also likely to invest extra time after school hours and even on weekends for preparation ($\chi^2 = 67.792, df = 4, p = .000$), mostly in schools ($\chi^2 = 25.136, df = 2, p = .000$).

Results indicated some differences in the way students prepared with respect to selected categories of competitions, especially category Algorithms – Python/Pascal/C/C++ and Algorithms Logo. Contestants of both categories were probably ready to invest considerable effort in preparation, namely to work extra with their teachers at school, after school hours or even on weekends. Contestants of Algorithms – Python/Pascal/C/C category would probably explore additional learning materials independently ($\chi^2 = 7.404, df = 2, p = .025$) or use examples of solved programming tasks from competition web sites (Infokup, Honi) ($\chi^2 = 9.957, df = 2, p = .007$). Also, they would probably take part in other open programming competitions (eg. COCI) or some winter/summer programming preparation camps. At the same time Algorithms – Logo contestants were very satisfied with their preparations and achieved success and they were likely not to change anything for the following competition ($\chi^2 = 8.189, df = 3, p = .042$).

Since the students are willing to invest extra effort to prepare for competition, it is interesting to explore what the success in this competition means to them and how it could motivate them, if so. About 51.4 % of students believe that success in this competition may represent additional features for enrollment in secondary school (eg. extra points), while others (33.3 %) find it has some or no (15.3 %) importance. 50% of the students believe that success in this competition could build some reputation in the school and among their peers. Almost equally

---

**Table 2: Distribution of students by the place of preparation and by organizing next year competition preparation**

<table>
<thead>
<tr>
<th>Preparations for the competition are held in school</th>
<th>For the next competition (if I participate) I will …</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>prepare the same way</td>
<td>not prepare at all</td>
</tr>
<tr>
<td>Count</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Percentage</td>
<td>29,2%</td>
<td>25%</td>
</tr>
<tr>
<td>Yes</td>
<td>Count</td>
<td>33</td>
</tr>
<tr>
<td>Percentage</td>
<td>39,3%</td>
<td>8,3%</td>
</tr>
</tbody>
</table>

Success in this competition so the level of knowledge and programming skills that are necessary for success in programming categories away exceed these curriculums. Study objective was to find out how students prepared for this competition, which teaching materials they used, also whether they worked alone or with the help of mentors, parents or friends, whether they worked mostly in school, or some IT club or at home, and generally to learn more about any strategy implemented in preparation for this competition.

Although many competitors highlighted that working with their teachers was the most helpful that claim couldn’t be extracted as a general significant conclusion in this research like it was previous pilot study (Bubica, Mladenovic, & Boljat, 2014). However, the importance of preparing with teachers at school could be seen from the following result: those students who had experience of previous competitions will probably prepare with their teachers at school for the next competition. Students who are preparing at school, mainly with the help of their teachers, were very satisfied with the way they worked and for further competition would probably prepare in the same way or would even seek assistance or prepare more (Table 2, $\chi^2 = 8.189$, df=3, $p = .042$). Also, if students organized preparation in their schools they would be likely less interested in seeking other learning materials elsewhere ($\chi^2 = 14.646$, df=2, $p = .001$).

Material from the curriculum of elective subject in elementary schools (Informatics) and regular subjects in high schools (Informatics, CS). On the other hand, the competition categories which include programming are extremely demanding for students primarily because programming content accounts for only 10-15% of the school’s curriculum so the level of knowledge and programming skills that are necessary for success in programming categories away exceed these curriculums. Study objective was to find out how students prepared for this competition, which teaching materials they used, also whether they worked alone or with the help of mentors, parents or friends, whether they worked mostly in school, or some IT club or at home, and generally to learn more about any strategy implemented in preparation for this competition.

---

**Table 2: Distribution of students by the place of preparation and by organizing next year competition preparation**

<table>
<thead>
<tr>
<th>Preparations for the competition are held in school</th>
<th>For the next competition (if I participate) I will …</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>prepare the same way</td>
<td>not prepare at all</td>
</tr>
<tr>
<td>Count</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Percentage</td>
<td>29,2%</td>
<td>25%</td>
</tr>
<tr>
<td>Yes</td>
<td>Count</td>
<td>33</td>
</tr>
<tr>
<td>Percentage</td>
<td>39,3%</td>
<td>8,3%</td>
</tr>
</tbody>
</table>
students believe that success in this competition has no importance (27.8%), some importance (33.3%) or great importance (38.9%) as a boost to think more about IT careers. Although, a more detailed analysis regarding competition categories reveals that Algorithms – Python/Pascal/C/C++ contestants are likely to perceive this competition as a boost to reflect on his career in IT sector.

Competition categories
Research of this specific competition is particularly interesting as it includes different areas of computer science, so almost every student could find an area interesting for him. Students who do not show interest in programming usually choose to perform in the category CS Fundamentals. CS Fundamentals is a category which includes knowledge about all basic CS concepts like networks, computer hardware and applicative software, data storage, manipulation, edition and presentation and so. This category is relatively new as it is been held since 2011, while other categories have been held continuously for more than twenty years. In any case, CS Fundamentals category is more popular among students what could be seen through the number of registered participants. This school year (2016), in the first (lowest) level of competition, participated 2880 students of primary and secondary schools in the category CS Fundamentals, in the category Algorithms – Python/Pascal/C/C++ (elementary schools) participated 612 students, in category the Algorithms – Python/Pascal/C/C++ (secondary schools) participated 629 while 1,122 students participated in the category Logo (Infokup, 2016).

It seems that the students take very seriously the differences between programming categories and category CS Fundamentals as it is very likely that CS Fundamentals competitor did not before, nor will in the future, participate in other competition categories ($\chi^2 = 32.658$, df = 4, $p = .000$). This is consistent with pilot research (Bubica, Mladenovic, & Boljat, 2014) which determined that contestants are very true to their primary category. Competitors of CS Fundamentals are very satisfied with the way in which they prepare for the state competition and generally very pleased with the success achieved. For them success in this competition doesn’t represent some respect in school or among peers (Table 3) or could encourage them towards CS profession (Table 4) but only represents a slight possibility of getting extra points for enrollment in secondary school.

**Table 3**: Distribution of CS Fundamentals competitors by their feeling of success could bring them respect in school or among peers

<table>
<thead>
<tr>
<th>CS fundamentals competitor</th>
<th>Success in this competition represents respect in school and among peers (3-level Likert scale)</th>
<th>Mean</th>
<th>N</th>
<th>Std. Dev.</th>
<th>Min.</th>
<th>Max.</th>
<th>Range</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
<td>1.64</td>
<td>44</td>
<td>.750</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>1.71</td>
<td>28</td>
<td>.763</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2.00</td>
</tr>
</tbody>
</table>

**Table 4**: Distribution of CS Fundamentals competitors by their feeling of success could encourage them towards CS professions

<table>
<thead>
<tr>
<th>CS fundamentals competitor</th>
<th>Success in this competition could encourage towards CS professions (3-level Likert scale)</th>
<th>Mean</th>
<th>N</th>
<th>Std. Dev.</th>
<th>Min.</th>
<th>Max.</th>
<th>Range</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
<td>2.14</td>
<td>44</td>
<td>.795</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2.00</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>2.07</td>
<td>28</td>
<td>.858</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2.00</td>
</tr>
</tbody>
</table>
Although a larger number of participants noted teachers as the greatest help in the preparations for the competition this claim showed statistical significance only for CS Fundamentals competitors ($\chi^2 = 8,223$, df $= 3$, $p = .042$).

Competitors of Algorithms – Python/Pascal/C/C++ category very likely did not before participated in other competition categories. They consider success in this competition primarily as a way to achieve extra points for secondary school enrollment but also as a very important factor which could interest them in IT professions (Table 5). As expressed earlier competitors in this category are extremely motivated to make additional effort in preparing for competition.

Competitors in Logo category are, like other competitors, very consistent in their competition category selection, so they very likely didn’t participated in other competition categories before. They don’t consider success in this competition as a way to achieve extra points for secondary school enrollment or as a way to achieve some prestige in school and especially not as a way to interest them towards IT professions. Maybe more than others, Logo competitors express satisfaction with their preparations and achieved success in this competition.

Table 5: Distribution of Algorithms – Python/Pascal/C/C++ competitors by experiencing competition a boost to IT professions

<table>
<thead>
<tr>
<th align="left">Success on this competition could encourage towards CS profession (3-level Likert scale)</th>
<th>Mean</th>
<th>N</th>
<th>Std. Dev.</th>
<th>Min.</th>
<th>Max.</th>
<th>Range</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td align="left">Algorithms – Python/Pascal/C/C++ competitor:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td align="left">No</td>
<td>1,86</td>
<td>43</td>
<td>.774</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2,00</td>
</tr>
<tr>
<td align="left">Yes</td>
<td>2,48</td>
<td>29</td>
<td>.738</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3,00</td>
</tr>
</tbody>
</table>

Some specificity regarding student’s geographical area with selection of certain categories and other subject competitions have been also noticed. Students from Central/Eastern Croatia and North Adriatic are more likely to participate in math ($\chi^2 = 9,829$, df $= 2$, $p = .007$) or physics ($\chi^2 = 8,186$, df $= 2$, $p = .017$) competition as well as IT competition than students from Central and Southern Adriatic. In Central and Southern Adriatic there are more first time competitors than in other regions what could be explained by higher withdrawal from the competition in this region compared to other regions in Croatia. Experience in the competing also proved to be significant in this study. It showed that students who participated for the first time were more inclined to work only within regular school hours while those who had some competing experience realized that this competition was very demanding and they were likely to regularly attend school preparation workshops and work hard after school hours or even on weekends.

Playing computer games regularly

Probably it is natural to expect that every child with computer access spends at least some time in playing computer games. In this study, it was investigated whether there was connection between regular playing computer games and factors like specific competition categories, gender and so.

In order to explore which are the games that attract most competitors informal discussion with students aged 11 to 14 during school hours singled out several categories of games which were used to explore whether there was a link between the competitors of Infokup competition and specific game category. Students where offered to choose between Strategy games (eg. Age of Empires, Stronghold, Chess) First Person Shooter games (eg, Call of Duty, Battlefield), Sports games (eg. FIFA, PES) and Racing games (eg Need for Speed) or something else.

From the collected data (Figure 2) it could be concluded that there was a number of competitors who played other games which weren’t offered here as 44 of them pleaded that they had played something else and only 18 of all students said that they did not play computer games regularly at all.

From the remaining results it looks like that Infokup competitors were likely not to play Racing games. Somehow it was expected that Strategy games like Age of Empires, Stronghold, Chess and so, may prevail in students’ choice but Sports games were the most interesting from all offered games categories. Distribution of
(week) hours of playing computer games regularly by competitors is shown in Figure 3. Considering that competitors of this competition are expected not only to have multitude of computer skills and knowledge but also more specific computer fluidity in working with computers the age in which contestants started playing selected games was investigated. Average beginning age was 10.6 years but further exploration of differences among computing categories showed that Algorithms – Python/Pascal/C/C++ competitors would probably start regularly playing computer games at the age of 10 while CS Fundamentals category competitors will likely start little later at the age of 12.

Results showed that boys are more likely than girls to regularly play a game weekly (Table 6, $\chi^2=8.878$, df=2, p=.012).

**Table 6:** Distribution of students by gender and playing computer games regularly

<table>
<thead>
<tr>
<th></th>
<th>Playing computer games regularly (regularly = playing some game every week)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Girls</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Percentage</td>
<td>45.5%</td>
<td>54.5%</td>
</tr>
<tr>
<td><strong>Boys</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>70</td>
<td>21</td>
</tr>
<tr>
<td>Percentage</td>
<td>76.9%</td>
<td>23.1%</td>
</tr>
</tbody>
</table>

It could also be interesting to explore whether there is a connection between the success on this competition and specific games categories as well as the number of (week) hours spent in regular playing computer games. Unfortunately, number of valid answers wasn’t sufficient to carry out some conclusion about it.

**CONCLUSIONS**

Although the research showed some differences between boys and girls some overly significant claims about it couldn’t derive, perhaps because girls participated in the competition in smaller number. While many competitors pointed out that their work with teachers was the most helpful during their preparations research has not shown strong evidence to confirm significance of this statement. Compared to pilot research great intrinsic student’s motivation to participate and prepare hard for the competition especially in some programming categories was confirmed. Very interesting results were found regarding playing computer games which could be a good start for further research.

The results of this study should help teachers to be better prepared for work with talented students but also to better motivate students for this type of competition. One of the major recommendations from this work is that students appreciate competition preparatory work with their teachers very much. They are ready to take part in preparatory workshops held in some extracurricular time in schools even on weekends because they consider such work high-quality and useful. Due to the strong intrinsic motivation shown by competitors especially of some programming category, as well as their desire to independently investigate other teaching materials, teachers might use training strategy which includes working and helping students but also finding specific ways to make additional learning materials more accessible to all of them. An example of such strategy could be the use of safe communication networks (eg. Edmodo) for quick and easy communication and exchange of teaching materials between teachers and students but also between students themselves, encourage cooperative learning and discussion about interesting tasks and problems related to the competition through such tools. Although, some differences in achieving success between girls and boys shouldn’t be expected, it is could be concluded from this research that something could be done to better motivate girls to become involved in such competitions as well to engage them to participate in extracurricular activities and workshops related to the competition.

Given the everyday raising need for IT professionals and general intention of IT sectors to raise interest among students towards these professions it is important to point out that the results in this research showed that success in some programming categories could point students towards IT professions. In the future, attitudes and opinions of teachers who prepare students for this competition would be explored in order to get more insights on this issue.
REFERENCES


