

Judul Artikel : Character Based on Multicultural and Local Wisdom in Early Childhood: The Construction of a Research Instrument

Penulis : Joko Pamungkas (Penulis 3)

Tahun Terbit: 2020

Nama Jurnal : The New Educational Review” w

Peringkat Artikel : scopus

Link: DOI: 10.15804/tner.2020.61.3.15

Foto:

The image shows a screenshot of the journal's website. The header features the journal title "JURNAL PENDIDIKAN ANAK" in white serif font on a dark purple background, with a graphic of four stylized human silhouettes in blue, red, green, and orange below it. A dark blue navigation bar contains links: HOME, ABOUT, LOGIN, REGISTER, SEARCH, CURRENT, ARCHIVES, ANNOUNCEMENTS, OPEN ACES POLICY, WITHDRAWAL, HISTORY. The main content area has a breadcrumb trail: Home > Vol 7, No 1 (2018): Jurnal Pendidikan Anak > Syamsudin. The article title is "KEPUASAN STAKEHOLDERS PAUD TERHADAP KINERJA LULUSAN PROGRAM STUDI S1 PGPAUD FIP UNY" by Amir Syamsudin, Joko Pamungkas, Nur Hayati. An "Abstract" section begins with the text: "Tujuan penelitian adalah untuk mengetahui tingkat kepuasan stakeholders PAUD atas kinerja lulusan program studi dan harapan stakeholders PAUD atas kinerja program studi S1 PGPAUD. Metode penelitian adalah survey terhadap stakeholders PAUD. Subjek penelitian sebanyak 48 orang lulusan program studi PGPAUD dan 48 orang kepala Taman Kanak-kanak yang tersebar di wilayah provinsi Daerah Istimewa Yogyakarta dan Jawa Tengah bagian selatan. Kriteria subjek penelitian adalah kepala TK dari lembaga PAUD yang mempekerjakan lulusan program studi S1 PGPAUD FIP UNY minimal sebanyak satu orang dengan masa kerja minimal satu tahun. Instrumen penelitian adalah angket terbuka. Teknik analisis data adalah deskriptif kuantitatif. Temuan hasil penelitian terbagi pada dua bagian. Bagian pertama tentang kepuasan stakeholders terhadap kinerja lulusan. Integritas kepribadian dan penguasaan teknologi informasi dari lulusan sangat memuaskan para stakeholders. Profesionalisme dalam". On the right side, there is a sidebar with a list of links: Editorial Board, Reviewers, Publication Ethics, Focus & Scope, Author Guidelines, Publishing System, Contact, Indexing & Abstracting. Below these links is a "USER" login section with input fields for "Username" and "Password", and a checkbox for "Remember me".



New E|Educational Review

2020
Vol. 61, No. 3

© Copyright by Wydawnictwo Adam Marszałek
Toruń 2020

ISSN 1732-6729

Publikacja "The New Educational Review" w języku angielskim oraz udostępnienie wersji cyfrowej w wolnym dostępie to zadania finansowane w ramach umowy 525/P-DUNdem/2018 ze środków Ministra Nauki i Szkolnictwa Wyższego przeznaczonych na działalność upowszechniającą naukę

The hard copy is an original version



Prenumeratę instytucjonalną można zamawiać w oddziałach firmy Kolporter S.A. na terenie całego kraju.
Informacje pod numerem infolinii 801 205 555 lub na stronie internetowej
<http://www.kolporter-spolka-akcyjna.com.pl/prenumerata.asp>

WYDAWNICTWO ADAM MARSZAŁEK, ul. Lubicka 44, 87-100 Toruń
tel./fax 56 648 50 70; tel. 56 660 81 60, 56 664 22 35
e-mail: info@marszalek.com.pl www.marszalek.com.pl

Drukarnia, ul. Warszawska 54, 87-148 Łysomice, tel. 56 678 34 78

CONTENTS

<i>Stanisław Juszczyk</i> Editor's Preface	9
■ GENERAL DIDACTICS	
<i>Ivana Rochovská, Martin Droščák, Viera Šilonová</i> Comparison of Preferred Didactic Forms and Methods in Homeschooling	13
<i>Kosová Beata, Hanesová Dana</i> Interdisciplinarity and Transdisciplinarity – Principles of Development of Doctoral Studies	26
<i>Simoneta Babiaková, Bronislava Kasáčová</i> Reading Preferences of Younger Learners in Slovak-Czech-Polish Comparison	38
<i>Ida Rindaningsih, Punaji Setyosari, Dedi Kuswandi, Saida Ulfa</i> Development of Seamless Learning to Facilitate Formal and Informal Learning in Elementary Education	51
<i>Aleksandra M. Mihajlović, Nenad R. Vulović, Milan P. Milikić</i> The Teaching Efficacy of Preservice Mathematics Teachers: Research in the Republic of Serbia	63
<i>Wuttiporn Suamuang, Surachai Suksakulchai</i> Perfection of Learning Environments Among High, Average and Low Academic Achieving Students	76
<i>Taejin Koh, Sungeun Choi, Jeong Kyung Park, Kyungeun Park</i> Are Tandem Classrooms Effective in Developing Intercultural Communicative Competence?	87
<i>Jiří Cihlár, Petr Eisenmann, Eva Hejnová, Jiří Přibyl</i> Problem Solving in Mathematics and Scientific Reasoning	97

<i>Tusino, Abdurrachman Faridi, Mursid Saleh, Sri Wuli Fitriati</i>	
The Effect of Hybrid Task-Based Language Teaching and Critical Thinking on Writing Performance in Indonesia	109
<i>Wafaa Salem Al-Yaseen</i>	
Impact of Jigsaw Cooperative Learning Technique on Enhancing Kuwait English Language Student-teachers' Speaking Skills	119
 ■ SOCIAL PEDAGOGY	
<i>Hu Lianqing, Ismail Adelopo, Kathryn Last</i>	
Understanding Students' Critical Thinking Ability: A Comparative Case of Chinese and British Undergraduates	133
<i>Ifeoma P. Okafor, Fausta Manafa, Atinuke O. Adeniji, Issa Nasiru Olokooba, Olumayowa Ayorinde</i>	
Innovation and Employability of National Youth Service Corps Members for Sustainable Development in South-East, Nigeria	144
<i>Milena M. Letić, Biljana S. Lungulov</i>	
Exploring the Moral Competencies of Gifted Students: Validation of Moral Competency Inventory – MCI	156
<i>Kokom Komalasari, Didin Saripudin</i>	
Living Values-Based Authentic Assessment in Civic Education in Fostering Student Character	168
<i>Harun, Amir Syamsudin, Joko Pamungkas, Abdul Manaf</i>	
Character based on Multicultural and Local Wisdom in Early Childhood: The Construction of a Research Instrument	181
 ■ SOME ASPECTS OF PSYCHOLOGY	
<i>Fauzia Nazam, Akbar Husain</i>	
Further Validation of Spiritual Values Scale	199
<i>Abdul Muhid, Ahmad Yusuf, Kusaeri, Dian Candra Rini Novitasari, Ahmad Hanif Asyhar, Ali Ridho</i>	
Determining Scholastic Aptitude Test as Predictors of Academic Achievement on Students of Islamic School in Indonesia	211

CONTRIBUTORS

Adelopo Ismail	University of the West of England (UWE), Bristol, United Kingdom	E-mail: Ismail.Adelopo@uwe.ac.uk
Adeniji Atinuke O.	M.A., Kwara State Universal Basic Education Board, Nigeria	E-mail: adeniji.atinuke@gmail.com
Al-Yaseen Wafaa Salem	PhD, Associate Professor, Kuwait University, College of Education, Department of Curriculum and Instruction, Shidadiya, Kuwait	E-mail: drwafaasalem@yahoo.co.uk
Asyhar Ahmad Hanif	M.Si, Lecturer, UIN Sunan Ampel Surabaya, Indonesia	E-mail: hanif@uinsby.ac.id
Ayorinde Olumayowa	PhD, University of Ilorin, Institute of Education, Ilorin, Kwara State, Nigeria,	E-mail: jacobolumayowaayorinde1@gmail.com
Babiaková Simoneta	Doc. PaedDr., PhD, Matej Bel University, Faculty of Education, Banská Bystrica, Slovak Republic	E-mail: simoneta.babiakova@umb.sk
Choi Sungeun	PhD, Professor, Hankuk University of Foreign Studies, Yongin, Korea	E-mail: estera90@naver.com
Cihlář Jíří	CSc., Professor, Jan Evangelista Purkyně University in Ústí nad Labem, Faculty of Science, Ústí nad Labem, Czech Republic	
Droščák Martin	Mgr., PhD, Assistant Professor, Comenius University in Bratislava, Faculty of Arts, Bratislava, Slovak Republic	E-mail: martin.droscak@uniba.sk
Eisenmann Petr	doc. CSc., Jan Evangelista Purkyně University in Ústí nad Labem, Faculty of Science, Ústí nad Labem, Czech Republic	
Faridi Abdur-rachman	Professor, Universitas Negeri Semarang, Semarang, Central Java, Indonesia,	E-mail: pakdur@mail.unnes.ac.id
Fauzia Nazam	PhD, Assistant Professor, Section of Psychology, Women's College, Aligarh Muslim University, Aligarh, India	E-mail: nazamfauzia@gmail.com
Fitriati Sri Wuli	PhD, Universitas Negeri Semarang, Semarang, Central Java, Indonesia	E-mail: sriwuli.fitriati@mail.unnes.ac.id
Hanesová Dana	PhD, Professor, PaedDr., Matej Bel University, Faculty of Education, Banská Bystrica, Slovak Republic	E-mail: dana.hanesova@umb.sk
Harun	PhD, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia	E-mail: harun@uny.ac.id
Hejnová Eva	PhD, Jan Evangelista Purkyně University in Ústí nad Labem, Faculty of Science, Ústí nad Labem, Czech Republic	E-mail: eva.hejnova@ujep.cz

Husain Akbar	Professor, Department of Psychology, Aligarh Muslim University, Aligarh, India	E-mail: profakbar6@gmail.com
Kasáčová Bronislava	Prof. PhDr., CSc., Matej Bel University, Faculty of Education, Banská Bystrica, Slovak Republic	bronislava.kasacova@umb.sk
Koh Taejin	PhD, Associate Professor, Hankuk University of Foreign Studies, Seoul, Korea	E-mail: india@hufs.ac.kr
Komalasari Kokom	PhD, Professor, Indonesia University of Education, Faculty of Social Sciences Education, Bandung, Indonesia	E-mail: komalasari110@yahoo.com
Kosová Beata	Dr.h.c., Professor, PhDr., Matej Bel University, Faculty of Education, Banská Bystrica, Slovak Republic	E-mail: beata.kosova@umb.sk
Kusaeri	Professor, UIN Sunan Ampel Surabaya, Indonesia	E-mail: kusaeri@uinsby.ac.id
Kuswandi Dedi	PhD, Associate Professor, Universitas Negeri Malang, Department of Educational Technology, Malang, Indonesia	E-mail: dedi.kuswadi.fip@um.ac.id
Last Kathryn	University of the West of England (UWE), Bristol, United Kingdom	E-mail: Kathryn.Last@uwe.ac.uk
Letić Lungulov Milena M.	PhD, Assistant Professor, University of Novi Sad, Faculty of Philosophy, Novi Sad, Serbia	E-mail: milenaletic@ff.uns.ac.rs
Lianqing Hu	Guangdong Peizheng College, Guangzhou, Guangdong, China	E-mail: 781540815@qq.com
Lungulov Biljana S.	PhD, Assistant Professor, University of Novi Sad, Faculty of Philosophy, Novi Sad, Serbia	E-mail: biljana.lungulov@ff.uns.ac.rs
Manaf Abdul	PhD student, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia	E-mail: abdulmanaf.2017@student.uny.ac.id
Manafa Fausta	PhD, National Open University of Nigeria	E-mail: fausymanafa@yahoo.com
Mihajlović Aleksandra M.	PhD, Associate Professor, University of Kragujevac, Faculty of Education, Jagodina, Serbia	E-mail: aleksandra.mihajlovic@gmail.com
Milikić Milan P.	MA, Teaching Assistant, University of Kragujevac, Faculty of Education, Jagodina, Serbia	E-mail: milikic.milan@yahoo.com
Muhid Abdul	Dr, Assoc. Prof., UIN Sunan Ampel Surabaya, Indonesia	E-mail: abdulmuhid@uinsby.ac.id
Novitasari Dian Candra Rini	M. Kom, Lecturer, UIN Sunan Ampel Surabaya, Indonesia	E-mail: diancrini@uinsby.ac.id

Okafor Ifeoma P.	PhD, University of Ilorin, Faculty of Education, Ilorin, Kwara State, Nigeria	E-mail: okafor.ip@unilorin.edu.ng
Olokooba Issa Nasiru	PhD, University of Ilorin, Faculty of Education, Ilorin, Kwara State, Nigeria	E-mail: olokooba.in@unilorin.edu.ng
Pamungkas Joko	M.Pd, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia	E-mail: joko_pamungkas@uny.ac.id
Park Jeong Kyung	PhD, Associate Professor, Hankuk University of Foreign Studies, Yongin, Korea	E-mail: parkjeong@hufs.ac.kr
Park Kyungeun	PhD, Assistant Professor, Hankuk University of Foreign Studies, Seoul, Korea	E-mail: kyungeunpark@hufs.ac.kr
Příbyl Jiří	PhD, Jan Evangelista Purkyně University in Ústí nad Labem, Faculty of Science, Ústí nad Labem, Czech Republic	
Ridho Ali	Dr, Assoc. Prof., UIN Maulana Malik Ibrahim Malang, Indonesia	E-mail: aliridho@uin-malang.ac.id
Rindaningsih Ida	Doctoral Student, Universitas Muhammadiyah Sidoarjo, Department of Education, Sidoarjo, Indonesia	E-mail: rindaningsih1@umsida.ac.id
Rochovská Ivana	Doc. PaedDr., PhD, Associate Professor, Catholic University in Ružomberok, Faculty of Education, Ružomberok, Slovak Republic	E-mail: ikrupova@gmail.com
Saleh Mursid	Professor, Universitas Negeri Semarang, Semarang, Central Java, Indonesia	E-mail: mursids@hotmail.com
Saripudin Didin	PhD, Professor, Indonesia University of Education, Faculty of Social Sciences Education, Bandung, Indonesia	E-mail: kalimaya36@yahoo.co.id
Setyosari Punaji	PhD, Professor, Universitas Negeri Malang, Department of Educational Technology, Malang, Indonesia	E-mail: punaji.setyosari.fip@um.ac.id
Šilonová Viera	PaedDr., PhD, Assistant Professor, Catholic University in Ružomberok, Faculty of Education, Ružomberok, Slovak Republic	E-mail: viera.silonova@ku.sk
Suamung Wuttiporn	PhD candidate, King Mongkut's University of Technology Thonburi, Faculty of Industrial Education and Technology, Bangkok, Thailand	E-mail: wuttiporn.s@mail.kmutt.ac.th
Suksakulchai Surachai	Assistant Professor, King Mongkut's University of Technology Thonburi, Department of Electrical Technology and Education, Bangkok, Thailand	Email: surachai.suk@mail.kmutt.ac.th

Syamsudin Amir	PhD, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia	E-mail: amirsyamsudin@uny.ac.id
Tusino	PhD student, Universitas Negeri Semarang, Semarang, Central Java, Indonesia	E-mail: tusino@umpwr.ac.id
Ulfa Saida	PhD, Assistant Professor, Universitas Negeri Malang, Department of Educational Technology, Malang, Indonesia	E-mail: saida.ulfa.fip@um.ac.id
Vulović Nenad R.	PhD, Assistant Professor, University of Kragujevac, Faculty of Education, Jagodina, Serbia	E-mail: vlennad@gmail.com
Yusuf Ahmad	M.Kom, Lecturer, UIN Sunan Ampel Surabaya, Indonesia	E-mail: ahmadyusuf@uinsby.ac.id

Editor's Preface

The present edition of *The New Educational Review* in 2020 constitutes the sixty-first issue of our journal since its foundation in 2003. In this issue there are papers from: China, the Czech Republic, India, Indonesia, Nigeria, Poland, the Republic of Korea, Kuwait, Serbia, Slovakia, Thailand, and the United Kingdom, because our journal is open for presentation of scientific papers from all over the world.

In the present issue the International Editors' Board have proposed the following sections: General Didactics, Social Pedagogy, and Some Aspects of Psychology.

In the section "General Didactics" we are publishing ten articles. The research by Ivana Rochovska, Martin Droščák, and Viera Šilonová deals with opinions of home schooling parents on preferred methods and forms of home schooling. The review study by Beata Kosová and Dana Hanesová explains interdisciplinary and transdisciplinary approaches, shows how they are put into practice in doctoral studies, and how the results of the interdisciplinary approaches are applied, but also outlines barriers to their implementation and their limitations. The aim of the study by Simoneta Babiaková and Bronislava Kasáčová is a comparative analysis of reading preferences of younger elementary school learners in Slovakia, the Czech Republic, and Poland. The purpose of the research by Ida Rindaningsih and her co-workers is to develop instructional design and learning planning matrices for seamless learning in teachers' and students' activities in order to facilitate formal and informal learning with limited use of mobile technology in elementary schools. The research by Aleksandra M. Mihajlović, Nenad R. Vulović, and Milan P. Milikić aims to study the psychometric properties and theoretical structure of the Serbian version of the Mathematics Teaching Efficacy Beliefs Instrument. Wuttiporn Suamuang and Surachai Suksakulchai in their article investigate how the perception of learning environments differs according to level of student academic achievement. Taejin Koh, Sungeun Choi, Jeong Kyung Park, and Kyungeun Park explore the effectiveness of tandem classrooms in promoting intercultural

communicative competence by comparing the competence of students before and after participation in tandem classes. Jiří Cihlár and his co-workers describe the results of a study whose aim is to explore correlations among the components of the construct of Problem-Solving Culture (mathematical intelligence, reading comprehension, creativity, and ability to use existing knowledge) and six dimensions of Scientific reasoning, which was tested by the Lawson's Classroom Test. The study by Tusino and his co-workers aims to describe the effect of hybrid task-based language teaching and critical thinking skills on writing performance among Indonesian learners. The quasi-experiment conducted by Wafaa Salem Al-Yaseen examines the impact of the jigsaw cooperative learning technique on enhancing the speaking skill of Kuwaiti student-teachers of English.

In the section "Social Pedagogy" we are publishing six articles. The purpose of the study by Hu Lianqing, Ismail Adelopo, and Kathryn Last is to investigate to what extent the language factor contributes to students' critical thinking abilities. The paper by Ifeoma P. Okafor and his co-workers examines the innovation and employability of National Youth Service Corps members for sustainable development in South-East Nigeria. The research by Milena L. Letic' Lungulov and Biljana S. Lungulov is to determine the moral competencies of gifted students in different domains and to examine the psychometric characteristics of the adapted version of the Moral Competency Inventory. The study by Kokom Komalasari and Didin Saripudin seeks to delineate a living values-based authentic assessment model in civic education to foster student character. The aim of the study by Harun and his co-workers is to confirm the construct of the multicultural and local wisdom character research instrument for early childhood. The paper of Abdul Muhid and his co-workers presents empirical data about the predictive ability of a test of scholastic ability for the academic achievement of Islamic school students in Indonesia.

In the section "Some Aspects of Psychology" we are publishing the study by Fauzia and Akbar Husain, which extends the initial validation of the Spiritual Values Scale by using structure equation modelling to revalidate the dimensionality and reliability of the spiritual values scale.

We hope that this edition, like the previous ones, will encourage new readers, not only from Central European countries, to participate in an open international discussion. On behalf of the International Editors' Board I would like to invite representatives of different pedagogical sub-disciplines and related sciences to publish their texts in *The New Educational Review*, according to the formal and essential requirements placed on our website: <https://tner.polsl.pl> – For Authors.

2021 New
E|Educational
Review



**General
Didactics**

Comparison of Preferred Didactic Forms and Methods in Homeschooling

DOI: 10.15804/ner.2020.61.3.01

Abstract

The research dealt with opinions of homeschooling parents on preferred homeschooling methods and forms. Using the questionnaire method, it mapped opinions of 78 parents from Slovakia, the Czech Republic and Poland. It examined the influence of selected variables, i.e. age of parents and number of homeschooled children, on the preference for methods and forms of education. On the basis of research findings it could be stated that younger respondents preferred unschooling more than older respondents. The older respondents, on the other hand, preferred classical teaching methods and forms more. It was also found that the number of homeschooled children had no influence on parents' choice of homeschooling methods and forms.

Key words: *homeschooling, homeschooling methods and forms, parents of homeschooled children, classical homeschooling methods and forms.*

Introduction

The process of education, not only in European countries, involves various factors which are often the result of the current situation in the education system of the country. For instance, parents' dissatisfaction with the school system, an effort for their children to achieve better study results, a desire to provide better conditions for the moral and ethical development of their children, discontent with the curriculum, teaching methods or value orientation of the school, religious

reasons, living in a remote rural settlement, various health issues of the children, or specific giftedness may be reasons why parents consider homeschooling their children. Although Slovakia, the Czech Republic, and Poland are countries where education is perceived mainly as an institutionalized process, in these countries, it is also legal to homeschool children.

Homeschooling is currently perceived as a trend¹ that came to Europe from the United States in the second half of the 20th century. Pioneers of homeschooling include e. g. Holt (1964, 1967, 2003), Moore, R. S. & Moore, D. N. (1975), Griffith (1997), Gaither (2008), Illich (2002), and Gray (20013).

Holt (1964, 1967, 2003) analyzed specific situations from his teaching experience, based on which he argued that there is no need to force children to learn – they would naturally learn on their own when ready to if given freedom to be led by their own interests and if they have a wide range of resources to learn from. Similarly, Gray (2013) described experience gained during many years of his research into children's self-education, starting with the self-education of hunters and gatherers in primitive tribes, and the self-education of children at Sudbury Valley School, Massachusetts.

Illich (2002) declared his belief that school should be separated from society. According to him, the school had an “anti-educational” effect on society. He maintained that instead of school, there should be free education as a natural, spontaneous, completely voluntary activity stemming from the child's interests.

While in the United States there are about 2.3 million homeschooled pupils, which is about 8% of all pupils (Ray, 2019), in Slovakia, the Czech Republic and Poland, respectively, homeschooling is opted for only by parents of 0.3% of all pupils (Mazur, Rochovská & Klačková 2019); however, this number is tending to rise. For instance, in the last five years the number of homeschooled children increased from 70 to 579 in Slovakia, from 1038 to 3232 in the Czech Republic and from 2699 to 11466 in Poland (Rochovská, Mazur & Dolinská, 2019).

In Slovakia and the Czech Republic research produced the same results as in the United States (e. g. Murphy, 2014; Gray & Rile, 2013; Cogan, 2010; Ray & Weller, 2003), where research confirmed that homeschooled children scored as well as their school attending peers in college entrance examinations. Slovak homeschooled children achieved very good results in their final examinations at the end of the school year. Similarly, experimental verification of homeschooling

¹ Nevertheless, homeschooling is nothing new; it is basically the oldest form of education. As written by Kašparová (2019), it is as old as humanity itself; however, replaced by a mass unified education system mainly for ideological reasons.

in the Czech Republic showed that it was, in all aspects, a valid alternative to the state institutionalized education system (Kašparová, 2019; Pastorová, Altmanová & Koubek, 2012).

The concern about homeschooling is of current interest in consideration of the current pandemic situation. Therefore, opinions and attitudes of the public may change in favour of homeschooling, which is why it is important to study it from various perspectives. The aim of this research was to study selected didactic aspects of homeschooling in Slovakia, the Czech Republic, and Poland. It was not focused on the goals and content of homeschooling, because they are prescribed by the state and given in the curricular documents of the respective countries (Rochovská, Mazur, 2019; Rochovská, Mazur, Dolinská, 2019), but this study dealt particularly with issues related to the process of homeschooling – methods and forms (Table 1).

Table 1. Methods and forms preferred by parents of homeschooled children (Rochovská, Mazur & Dolinská, 2019)

	Respondents' responses	PL		CZ		SK		Total	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>N</i>	%
M ethods	Unschooling	7	9.86	9	18.75	8	15.69	24	14.12
	Working with a textbook	9	12.68	4	8.33	2	3.92	15	8.82
	Reading, writing, speaking	8	11.27	1	2.08	5	9.80	14	8.24
	Projects	6	8.45	2	4.17	4	7.84	12	7.06
	Working with a workbook	3	4.23	3	6.25	3	5.88	9	5.29
	Plays	4	5.63	2	4.17	2	3.92	8	4.71
	Experiential learning	3	4.23	1	2.08	4	7.84	8	4.71
	Experiments, discovering	2	2.82	2	4.17	2	3.92	6	3.53
	Working with the Internet	3	4.23	0	0.00	1	1.96	4	2.35
	Watching films and videos	2	2.82	2	4.17	0	0.00	4	2.35
	Portfolio creation	0	0.00	2	4.17	0	0.00	2	1.18
	Lapbooks	1	1.41	1	2.08	0	0.00	2	1.18
F orms	Excursions	6	8.45	1	2.08	2	3.92	9	5.29
	Online forms (e. g. Khan Academy)	3	4.23	3	6.25	2	3.92	8	4.71
	Learning outside	3	4.23	1	2.08	2	3.92	6	3.53
	Hobby activities	2	2.82	1	2.08	1	1.96	4	2.35
	Community schools, groups	1	1.41	0	0.00	2	3.92	3	1.76
a.c.	Montessori	2	2.82	2	4.17	5	9.80	9	5.29
	Other	6	8.45	11	22.92	6	11.76	23	13.53

Legend: PL – Poland, CZ – the Czech Republic, SK – Slovakia, a. c. – alternative conceptions

Research methods

Research problem

The research problem was formulated on the basis of a number of previous studies (Kostelecká, 2010; Kašparová, 2019; Rochovská & Mazur, 2019; Rochovská, Mazur & Dolinská, 2019; Mazur, Rochovská & Klačková, 2019). As shown in Table 1, it was found that 14.12 % of parents of homeschooled children, participating in the research, preferred unschooling² as the main form of education. Other preferred methods included working with a textbook (8.82 %), working with a workbook (5.29 %) or reading, writing, and speaking (8.24 %). Reported organizational forms included mainly excursions (5.29 %), learning outside (3.53 %) and learning in a community school or group (1.76 %). Parents of homeschooled children also reported that they were using various projects, the pedagogical concepts of Maria Montessori, plays, experiential learning, etc. (Rochovská, Mazur & Dolinská, 2019). Mazur, Rochovská & Klačková (2019) investigated whether the pedagogical education of parents of homeschooled children in Slovakia, the Czech Republic, and Poland had an impact on their choice of teaching methods. The hypothesis that respondents without pedagogical education preferred unschooling more than respondents with pedagogical education was not confirmed. Likewise, the hypothesis that respondents with pedagogical education preferred classical methods and forms (working with a textbook, a workbook or reading, writing, and speaking) more than respondents without pedagogical education was also not confirmed.

The current research problem thus was an investigation of selected factors which influence the choice of methods and forms of homeschooling. The aim of the research was to find out, based on opinions of of homeschooled children's parents, whether their preference for the methods and forms in homeschooling depended on the age of respondents and on the number of children being homeschooled. Based on the aim of the research and in connection with the results of the research mentioned above, four hypotheses were formulated:

² Unschooling can be considered one of the forms of homeschooling. While some parents strictly follow the prescribed curriculum and make an effort to teach the subject matter using curricular documents or textbooks, parents pursuing unschooling are led by the child's interests and needs regardless of the prescribed curriculum. The concept of unschooling may be identified with Holt's philosophy of education (1964, 1967, 2003). Here, learning is perceived as a life-long process where the whole world around is the classroom (Ricci, 2012).

H1: Younger respondents in PL, CZ, and SK prefer unschooling more than older respondents in the same countries;

H2: Older respondents in PL, CZ, and SK are more likely to prefer classical methods and forms than active methods (e.g. working with a textbook, workbook or reading, writing and speaking) more than younger respondents in the same countries;

H3: Respondents homeschooling one child prefer unschooling more than respondents homeschooling more than one child in researched countries;

H4: Respondents homeschooling one child prefer classical methods and forms (working with a textbook, a workbook or reading, writing and speaking) more likely more than respondents homeschooling more than one child in researched countries.

Research sample

The research involved 78 parents of homeschooled children, including 30 in Poland (PL), 27 in the Czech Republic (CZ), and 21 in Slovakia (SK). The age of parents ranged between 21 and 60 years. Most respondents were 31 to 40 years old (Table 2).

Table 2. Age of respondents

Age (years)	PL		CZ		SK		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
21–30	0	0.00	1	3.70	2	9.52	3	3.85
31–40	14	46.67	16	59.26	14	66.67	44	56.41
41–50	12	40.00	10	37.04	5	23.81	27	34.62
51–60	3	10.00	0	0.00	0	0.00	3	3.85
No answer	1	3.33	0	0.00	0	0.00	1	1.28
Total	30	100	27	100	21	100	78	100

Of the total number of respondents, 66.67% were homeschooling one child, 30.77% more than one child, and 2.56% failed to give the number of children being homeschooled (Table 3).

Of the total number of children, 1.89% were 5 years old, 10.38% were 6 years old, 23.58% were 7 years old, 10.38% were 8 years old, 14.15% were 9 years old, 14.15% were 10 years old, 7.55% were 11 years old, 8.49% were 12 years old, 3.77% were 13 years old, 2.83% were 14 years old, 1.89% were 18 years old, and 0.94% were 19 years old.

Table 3. Number of homeschooled children per respondent

Number of children	PL		CZ		SK		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
1	23	76.67	16	59.26	13	61.90	52	66.67
2	4	13.33	7	25.93	7	33.33	18	23.08
3	1	3.33	4	14.81	0	0.00	5	6.41
4	1	3.33	0	0.00	0	0.00	1	1.28
No answer	1	3.33	0	0.00	1	4.76	2	2.56
Total	30	100	27	100	21	100	78	100

Research tools and procedures

The research tool included an online structured questionnaire consisting of ten open-ended items. Four items were assessed to verify the above hypotheses. Respondents reported which methods and forms they preferred in homeschooling their children. No common classification of methods and forms was used in order to obtain authentic statements from respondents. They also reported their age and number of children being homeschooled. The questionnaire was administered online via homeschooling social groups.

Data analysis

Data were evaluated using a quantitative approach. Respondents answered the open-ended question “*Which methods and forms did you choose in homeschooling your child?*” in their own words. There was no limit of length for the answers. Subsequently, the answers were grouped in categories. The most frequent category was “unschooling” (14.12 %), encompassing all statements of respondents that corresponded with the philosophy of unschooling, e.g. “*self-directed education*”, “*the child self-educates*”, etc. If respondents’ answer contained more methods and forms with at least one being unschooling, or a statement corresponding with the philosophy of unschooling, the answer was included in the category “unschooling” and the other reported methods and forms were included in other relevant categories.

The second most frequent category was named “classical methods and forms” and included three sub-categories: “*working with a textbook*” (8.82 %), “*reading, writing and speaking*” (8.24 %) and “*working with a workbook*” (5.29 %).

The above two most frequent categories – “unschooling” and “classical methods and forms” – became variables in formulation of the hypotheses. The hypotheses

were tested statistically. Data were verified using Pearson's Chi-square test of independence.

Research results

Influence of respondents' age on their preference for unschooling

Data on respondents' age and preferred methods and forms reported by respondents are presented in the pivot table below (Table 4).

Table 4. Respondents' age and preference of methods and forms in homeschooling

	Current frequency			Expected frequency	
	Preference for unschooling (24)	Preference for other methods and forms * (53)		Preference for unschooling	Preference for other methods and forms*
Under 40 years of age (47)	19	28	Under 40 years of age	14.65	32.35
Above 40 years of age (30)	5	25	Above 40 years of age	9.35	20.65

* apart from unschooling

Of younger respondents under 40 years of age ($n = 47$), 19 (40.43 %) reported preference for unschooling, and 28 (59.57 %) preference for other homeschooling methods and forms. Of older respondents above 40 years of age ($n = 30$), 5 (16.67 %) reported preference for unschooling, and 25 (83.33 %) preference for other homeschooling methods and forms. One respondent failed to give their age (Table 2).

The hypothesis was verified using Pearson's Chi-square test of independence. There was a statistically significant difference ($\chi^2(1) = 4.818$, $df = 1$, $p = 0.028$) between respondents under 40 years of age and above 40 years of age, in preference for unschooling and other homeschooling methods and forms. The hypothesis H1 was accepted.

Influence of the age of respondents on preference for classical methods and forms in homeschooling

Data on respondents' age and preferred methods and forms reported are presented in the pivot table below (Table 5).

Table 5. Respondents' age and preference of homeschooling methods and forms

	Current frequency			Expected frequency	
	Preference for classical methods and forms * (38)	Preference for other methods and forms * (39)		Preference for classical methods and forms *	Preference for other methods and forms *
Under 40 years of age (47)	19	28	Under 40 years of age	23.19	23.81
Above 40 years of age (30)	19	11	Above 40 years of age	14.81	15.19

* apart from classical methods and forms

Of younger respondents under 40 years of age ($n = 47$), 19 (40.43%) reported preference for classical methods and forms, and 28 (59.57%) preference for other methods and forms in homeschooling. Of older respondents above 40 years of age ($n = 30$), 19 (63.33%) reported preference for classical methods and forms, and 11 (36.67%) preference for other methods and forms in homeschooling. One respondent failed to give their age (Table 2).

The hypothesis was verified using Pearson's Chi-square test of independence. There was a statistically significant difference ($\chi^2(1) = 3.844$, $df = 1$, $p = 0.050$) between older and younger respondents, in preference for classical methods and forms and other methods and forms in homeschooling. The hypothesis H2 was accepted.

Influence of the number of homeschooled children on preference of unschooling

Data on the number of homeschooled children and preferred methods and forms reported by respondents are presented in the pivot table below (Table 6).

Of respondents homeschooling one child, ($n = 52$), 14 (26.92 %) reported preference for unschooling, and 38 (73.08 %) preference for other homeschooling methods and forms. Of respondents homeschooling more than one child ($n = 24$), 10 (41.67 %) reported preference for unschooling and 14 (58.33 %) preference

Table 6. Number of children homeschooled and preference for homeschooling methods and forms

	Current frequency			Expected frequency	
	Preference for un-schooling (24)	Preference for other methods and forms * (52)		Preference for un-schooling	Preference for other methods and forms*
One child (52)	14	38	One child	16.42	35.58
More than one child (24)	10	14	More than one child	7.58	16.42

* apart from unschooling

for other homeschooling methods and forms. Two respondents failed to give the number of children being homeschooled (Table 3).

The hypothesis was verified using Pearson's Chi-square test of independence. There was no statistically significant difference ($(\chi^2(1) = 1,652, df = 1, p = 0.199)$) between respondents homeschooling one child and respondents homeschooling more children, in preference for unschooling and other homeschooling methods and forms. The hypothesis H3 was rejected.

Influence of the number of homeschooled children on preference for classical methods and forms in homeschooling

Data on the number of homeschooled children and preferred methods and forms reported by respondents are presented in the pivot table below (Table 7).

Table 7. Number of children homeschooled and preference for homeschooling methods and forms

	Current frequency			Expected frequency	
	Preference for classical methods and forms * (38)	Preference for other methods and forms * (39)		Preference for classical methods and forms *	Preference for other methods and forms *
One child (52)	25	27	One child	25.32	26.68
More than one child (24)	12	12	More than one child	11.68	12.32

* apart from classical methods and forms

Of respondents homeschooling one child, ($n = 52$), 25 (48.08 %) reported preference for classical methods and forms and 27 (51.92 %) preference for other methods and forms in homeschooling. Of respondents homeschooling more than one child ($n = 24$), 12 (50 %) reported preference for classical methods and forms and 12 (50 %) preference for other methods and forms in homeschooling. Two respondents failed to give the number of children being homeschooled (Table 3).

The hypothesis was verified using Pearson's Chi-square test of independence. There was no statistically significant difference ($\chi^2(1) = 0,24$, $df = 1$, $p = 0,876$) between respondents homeschooling one child and respondents homeschooling more children, in preference for classical and other methods and forms in homeschooling. The hypothesis H4 was rejected.

Discussion

The research confirmed that younger respondents preferred unschooling more than older respondents. However, the popularity of unschooling in the countries studied may be expected to rise in future (Kašparová, 2019).

It was also found that older respondents preferred classical methods and forms in homeschooling more. Older respondents (above 40 years of age) in the post-communist countries which were examined in the research, had studied either during the era of communism or not long after it, thus in their schooling classical methods and frontal forms of education, uniformity, directive approach, etc. had been applied. By contrast, younger respondents (under 40 years of age) could have also experienced innovative methods and forms of education during their schooling. Educators can be expected to use mainly the methods and forms they themselves experienced during their schooling.

Respondents homeschooling more than one child did not prefer unschooling more than respondents homeschooling only one child. Also, respondents homeschooling one child did not prefer classical methods and forms more than respondents homeschooling more than one child. The research findings do not agree with Kašparová's (2019) assertion that the more experience the educator (parent in this case) has, the more relaxed his or her approach is to the prescribed curriculum and so he or she dares to also apply alternative methods and forms of education.

Parents homeschooling more children certainly have more experience with such education than parents homeschooling the first child. Nevertheless, the research confirmed that the number of children homeschooled had no influence on respondents' choice of homeschooling methods and forms.

Limitations of the research are that the questionnaire method allows us to determine only preferences for homeschooling methods and forms, but not the actual situation. A series of observations should be carried out to show which methods and forms are actually used by respondents. Although the questionnaire question was “*Which methods and forms did you choose in homeschooling your child?*”, the term “preference” of methods and forms was used instead of “use” when interpreting the results.

Conclusion

The conclusions of the research may contribute to more detailed information on the issue of didactic aspects of homeschooling. It was found that younger respondents preferred unschooling more than older respondents, while older respondents preferred classical methods and forms more. It was also found that the number of children homeschooled did not influence their parents’ choice of homeschooling methods and forms.

The choice of homeschooling methods and forms depends to a large extent on the goal of education as seen by parents. Parents preferring classical methods and forms may perceive success in a compulsory examination as the goal. On the other hand, parents preferring unschooling perceive education rather as learning for life and so its goal should be acquiring competencies which help the child to live a valuable life. These considerations may also be perceived as implications for further research. In addition, the aim of further research could be to find out whether there is connection between preferred methods and forms and problems in compulsory examination. It can be assumed that respondents preferring unschooling may have more problems in the compulsory examination which is more in line with the classical school system, and may be more oriented to tests and memorization of the prescribed subject matter. It can also be assumed that where parents work with a textbook and workbook to homeschool their children, their children will have fewer problems in the compulsory examination. The examination requires that prescribed content and performance standards are achieved, and learning tasks in textbooks and workbooks are based precisely on these prescribed standards.

Homeschooling is not a modern phenomenon, although its legal application in Slovakia, the Czech Republic and Poland does not have a long tradition. However, opinions of parents of homeschooled children and the success of their children in end-of-year compulsory examinations as well as in university entrance tests

indicate that, when conceived appropriately, homeschooling may be an sufficient alternative to school education.

Acknowledgement

The research is published as a partial output of the VEGA Project No. 1/0383/19 “Analysis of the state of technical education and development of technical skills of pupils at primary school” and VEGA Project No. 1/0522/19 “Creation of Inclusive Environment in Nursery School and Inclusive Approaches in Diagnostics and Stimulation of the Development of Socially Disadvantaged Children”.

References

- Cogan, M. F. (2010). Exploring academic outcomes of homeschooled students. *Journal of College Admission*, 208, 18–25.
- European Commission (2018). *Home Education Policies in Europe. Primary and Lower Secondary Education. Eurydice Report*. Brussels: Education, Audiovisual and Culture Executive Agency
- Gaither, M. (2008). *Homeschool: An American History*. New York: Palgrave Macmillan.
- Gray, P. & Riley, G. (2013). The challenges and benefits of unschooling, according to 232 families who have chosen that route. *Journal of Unschooling and Alternative Learning*, 7(14), 1–27.
- Gray, P. (2013). *Free to learn: Why unleashing the instinct to play will make our children happier, more self-reliant, and better students for life*. New York: Basic Books.
- Griffith, M. (1997). *The homeschooling handbook: From preschool to high school, a parent's guide*. Rocklin: Prima Publishing.
- Holt, J. (1964). *How children fail*. Massachusetts: Da Capo Press.
- Holt, J. (1967). *How children learn*. New York: Pitman Publishing Company.
- Holt, J. (2003). *Teach your own: The John Holt book of homeschooling*. Massachusetts: Da Capo Press.
- Illich, I. (2002). *Deschooling society*. London: Marion Boyars.
- Kašparová, I. (2019). *Spolu. Průvodce domácího vzdělávání v České republice* [Together. Guide to Homeschooling in the Czech Republic], Bratislava, Slovakia: Akamedia.
- Kostecká, Y. (2010). Home education in the post-communist countries: Case study of the Czech Republic. *International Electronic Journal of Elementary Education*, 3(1), 29–44.
- Mazur, P., Rochovská, I. & Klačková, B. (2019). The Issue of Homeschooling in Poland, the Czech Republic and Slovakia from the Perspective of Parents of Homeschooled Children. *The New Educational Review*, 58 (4), 54–71.
- Moore, R. S. & Moore, D. N. (1975). *Better late than early: A new approach to your child's education*. Surry Hills, Australia: Reader's Digest Press.

- Murphy, J. (2014). The Social and Educational Outcomes of Homeschooling. *Sociological Spectrum*, 34(3), 1–33.
- Pastorová, M., Altmanová, J. & Koubek, P. (2012). *Porovnávací analýza: Domáce (individuálne) vzdelávanie* [Comparative Analysis: Home (Individual) Education]. Praha: Národný ústav pre vzdelávanie [National Institute for Education].
- Ray, B. & Weller, N. (2003). Homeschooling: An overview and financial implications for public schools. *School Business Affairs*, 69(5), 22–26.
- Ricci, C. (2012). *The Willed Curriculum, Unschooling, and Self-Direction: What Do Love, Trust, Respect, Care, and Compassion Have to do with Learning?* Toronto: Ricci Publishing.
- Rochovská, I. & Mazur, P. 2019. Theoretical Basis of Individual (Home) Education in Slovakia, the Czech Republic and Poland. *Pedagogika.sk. Slovak Journal for Educational Sciences*, 10(4), 254–273.
- Rochovská, I., Mazur, P., & Dolinská, E. (2019). Homeschooling in Poland, the Czech Republic and Slovakia. *Education Policy, Management and Quality*, 11(2), 64–76.

Interdisciplinarity and Transdisciplinarity – Principles of Development of Doctoral Studies

DOI: 10.15804/tner.2020.61.3.02

Abstract:

In future, changes in science and society will increasingly demand interdisciplinarily prepared professionals and researchers. Inter/transdisciplinarity has been worked on theoretically and scientifically examined. This review study shows how both approaches are explained, how they are put into practice in doctoral studies, the results of the interdisciplinary approaches applied, but also their limitations and barriers.

Key words: *interdisciplinarity, transdisciplinarity, doctoral studies.*

Introduction

At the turn of the 21st century there are fundamental changes in the concept of science and in the way of knowledge is produced. According to Gibbons et al. (1994), science passes from Mode 1 to Mode 2, from a monodisciplinary conception to changeable and purposeful research fields where the goal is mainly to effectively influence reality. In this Mode, science has an inter/transdisciplinary and heterogeneous character; theory and practice as well as basic and applied research intertwine, creating the so-called hybrid science with a large amount of knowledge produced in the context of application. Science should introduce innovations at a rapid pace, which requires academics to take part in various

inter-disciplinary discourses and interactions. Scientific communities re-group to form temporary networks with various actors in relation to the problems needing to be dealt with. Research is typical of organizational diversity, diversity of research strategies and environments.

In the 2nd decade of the 21st century, new requirements for the future of professions are already clearly articulated. This is apparent from the extensive survey conducted by the World Economic Forum (WEF, 2016, 2018). By 2022, in a quarter of today's job positions, it is expected that more than 70% of work tasks will have been automated on the basis of collaboration between humans and technology (WEF, 2018, pp. 10–11). The report warns that the system of acquisition of traditional qualifications, which is focused on “hard” professional competencies, preparing ready-made specialists for a single field, is already obsolete and is hindering future progress. More than specialists, persons capable of solving a certain area of problems, able to take into account all that is related as well as arising contexts will be wanted (WEF, 2016, p. 32). Inter-disciplinarily prepared employees are required, with emphasis placed not on their factual knowledge, because data and theories will be “delivered” mainly by machines, but substantially on transversal skills, which will become the core of most occupations (*ibid.*, p. 22).

Changes in the concept of science and professions also require a new style of academic thinking beyond disciplinary “boxes”. One effective way is seen in the training of new academics. New models are emerging of doctoral studies, e. g. a professional or collaborative doctorate, based on inter- and trans-disciplinary collaboration (Louw & Muller, 2014, Borell-Damian, 2015). 85% of European universities in the European University Association (EUA) have doctoral schools or similar specific structures for doctoral education (Hasgall et al., 2019, p.8) aimed at development of transversal skills, inter- and trans-disciplinarity by a panel of supervisors from various disciplines. According to Darbellay, (2015) “in the light of an academic organization” inter- and trans-disciplinarity might be viewed as a disruptive innovation strategy or as a means of evolutionary transformation of universities. In this digital context, the medium and long-term sustainability of our universities will depend on their capacity for innovation between and beyond disciplinary divides based on dual logic of continuity and transformation (pp. 172–173).

Methods of research

To elucidate this further, a narrative review study has been chosen, which describes the findings obtained by previous research, summarizes them, reaches

more general conclusions and may provide a form of explanation of various aspects of the problem (Mareš, 2013, p. 430). The form of a narrative review study has been preferred for two reasons. The first being the fact that there are a very large number of publications and studies in the world literature, written prevalingly in English, about inter- and trans-disciplinarity and about doctoral studies, that cannot be treated within the scope of this contribution. A narrative review study allows us to concentrate on only a representative sample of works, or to carry out a targeted overview structured by selected aspects. The second reason is that in Central European countries, this issue has not yet received sufficient attention. Contributions by authors from these countries are rare, and do not address the concept of inter-disciplinarity either in general, or in relation to doctoral studies.¹ In the Central European area, this is therefore a mapping of the state-of-the-art, summarization of research results and integration of the findings without claiming complexity in order to give the reader an introductory and at least partially conceptual an insight.

The review has been created to answer three research questions: 1) How is inter/trans-disciplinarity defined theoretically? 2) How is inter/trans-disciplinarity promoted in doctoral studies? 3) What are the research results of the impact of inter-disciplinarity on students (especially) of doctoral studies?

Phase 1 was a world databases review² of literature published after the year 2000, using the key words “interdisciplinary”, “transdisciplinary” and “doctoral studies”. Due to the fact that only periodicals directly dealing with doctoral studies provided more than 2000 sources, it was necessary to narrow down the selection in a targeted manner. In Phase 2, which lasted almost one year, more key terms were gradually searched for and reviewed. To establish conceptual definitions, the substantives *inter-disciplinarity* and *trans-disciplinarity* were worked with. For inter-disciplinary activities in Ph.D. studies, the terms *interdisciplinary doctoral studies/instruction/training*, *interdisciplinary teaching strategies*, but after studying various aspects of the problem, the terms *doctoral/graduate/postgraduate school* were also used. The existence of interdisciplinary activities was reviewed on websites of 15 universities and their doctoral schools in 14 EU countries. To find out results on research, the term *interdisciplinary research* was also used in addition to

¹ Between 2005 and 2019, the Central European periodical *The New Educational Review* published 8 contributions with the key word “interdisciplinary”, but addressing an interdisciplinary approach to counseling, rehabilitation, visions of university, definitions of training or integration of information in instruction in selected subjects.

² The co-author of the study conducted the literature search during her short visit to Cambridge University in 2018 in the databases the University had access to.

the terms above. It is not possible to express numerically how many abstracts were studied in Phase 2. Phase 3 – production of reviews and synthesizing conclusions – included 64 publications and studies³ published from 2005 to 2018 in English and relating to the 3 research questions above.

Results

Theoretical definition of inter-disciplinarity and trans-disciplinarity

The theoretical definition of inter/trans-disciplinarity is based on 11 representative sources. According to most of them, inter-disciplinarity is more than juxtaposing different disciplinary viewpoints, because it involves collaborative and integrative approaches by disciplines to a given topic of research. First it was characterized as bringing together distinctive components of two or more disciplines (Nisani, 1997, p. 203). At present it is defined as collaboration of established disciplines that interact dynamically to allow the complexity of a given object to be studied (Darbellay, 2015, p. 165). It is interaction between different bodies of knowledge or research practices, a variety of different ways of bridging and confronting the prevailing disciplinary approaches, including all activities that juxtapose, apply, combine, synthesize, integrate or transcend parts of two or more disciplines (Huutoniemi et al., 2010, p. 80). It can be a matter of transferring or borrowing concepts or methods from another scientific field, or of hybridization, or transferring mechanisms between disciplines, at an empirical, methodological or complex theoretical level, thus from integration of data and methods to a new field of knowledge, or a new paradigm of approach (ibid., p. 82–85).

The aim of interdisciplinary effort is to overcome the conceptual and methodological boundaries between fields of research in order to acquire new knowledge. Therefore, in addition to the aspect of interaction the aspect of production is also emphasized – the creation of knowledge, and research that transcends disciplinary boundaries, deals with problems by interconnecting several points of view, and rejecting solutions from single disciplines (Hicks et al., 2010, Bridle et al., 2013, Darbellay, 2015). A new field of research is created that cannot be assigned

³ For all sources and web sites of universities see: Kosová, B., Hanesová D., Šukolová, D. et al., 2019, <https://www.pdf.umb.sk/katedry/katedra-elementarnej-a-predskolskej-pedagogiky/publikacie/book-19337/doktorandska-skola-cesta-k-transformacii-a-inovacii-doktorandskeho-vzdelavania-vo-svete-a-na-slovensku.html>

to any particular scientific discipline (e. g. transformation of society, migration, diversity, etc.).

Trans-disciplinarity of research and education is based on the fact that today knowledge is not born only on the border between scientific disciplines, but is increasingly circulating between theory and practice. According to Darbellay (2015, p. 166) this trend has two major and complementary orientations:

- Epistemological/theoretical trans-disciplinarity – This is a process of knowing that transcends boundaries not only between sciences but also all components of reality; it entails reconfiguring disciplinary divisions within a global and integrated perspective;
- Pragmatic/applied trans-disciplinarity – This is a method of research that brings political, social, and economic actors, as well as ordinary citizens, into the research process itself in a “problem-solving perspective”, from outside contributing to the construction of knowledge and solution of social problems (see Bridle et al., 2013).

Current research requires “the transdisciplinary combination of knowledge resources beyond the boundaries of an academic context” (Huutoniemi et al., 2010, p. 80). Applications and innovations in the transdisciplinary mode include universities, service institutions, businesses, the third sector, etc. Researchers get impulses from various work teams, professional associations and employers, with research transforming its conclusions to innovations which meet their needs.

Introducing inter-disciplinarity and trans-disciplinarity to doctoral studies

Universities have developed a variety of activities in the area of inter-disciplinarity (supplemented by a transdisciplinary dimension, as the case may be) that are gradually changing the character of research and the training of beginning researchers. Table 1 presents authors treating the issue theoretically or gives examples of universities implementing the issue in practice.

Apart from a variety of activities, interdisciplinary teaching strategies are a common way in which development of inter-disciplinarity is defined and which allows different perspectives to be seen. The core of this is seen in interdisciplinary encounters where professionals from various disciplines discuss and work together “face to face” and this has the aim of fostering interdisciplinary thinking and collaboration (Bridle et al., p. 23). The purpose is to achieve open communication, which implies listening to, being curious about, and understanding each other’s perspectives and the potential contributions of each discipline to joint efforts. This communicative attitude is referred to as appreciative inquiry (Graybill, 2006,

Table 1. Main ways of development of inter-disciplinarity in Ph.D. studies

Exposure to inter-disciplinarity in the study of the discipline	Obligation to choose a course in another discipline	University of Szeged
	Interdisciplinary courses	University of Helsinki London Global University, etc.
	The second supervisor from another discipline	Institute of Science and Technology, Austria
Interdisciplinary doctoral studies	Interdisciplinary theme of the dissertation	Jones, 2010 Institute of Science and Technology, Austria Open University, UK
	Interdisciplinary curriculum taught by various experts	Jones, 2010 University of Helsinki University of Leicester, London Global University
	Interdisciplinary teaching strategies	Bridle et al., 2013 Graybill et al., 2006 Duerr, 2008
	Team/panel of supervisors, team-teaching	Carr et al., 2018 Taylor et al., 2018 Jones, 2010
Transdisciplinary doctoral studies	Collaborative doctorate	Borrell-Damian et al., 2015 Taylor et al., 2018
	Professional doctorate	Louw & Muller, 2014
	Inter-institutional networking	London Global University Central European Institute of Technology
Doctoral schools for doctoral students of various disciplines	Interdisciplinary structure (university, supra-disciplinary structure, consortium of universities, etc.)	Matas, 2012 University of Edinburgh Université Pierre-et-Marie-Curie, Paris University of Utrecht.
	Joint education	Hasgall et al., 2019
	Joint research	Carr et al., 2018
	Joint work (projects, products, co-authorship)	Bridle et al., 2013 Saari & Moilanen, 2012
	Joint events, presentations, evaluations	Carr et al., 2018 Saari & Moilanen, 2012 All universities under review
	Joint training in transversal skills	Hasgall et al., 2019 All universities under review
	Interdisciplinary encounters	Bridle et al., 2013 Graybill et al., 2006
Organizational measures	Shared offices	Carr et al., 2018

Source: own work

p. 762). When people come from different mono-disciplinary backgrounds where terms and concepts have different meanings, it is important to carefully examine what is meant through clarification questions and formulation of conclusions.

Interdisciplinary encounters are a frequent form of work in doctoral schools of a cross-disciplinary character. They may include informal group discussions based on readings, fictional scenarios, lectures with discussions, presentations from participants with discussions, experience sharing, generating concrete outputs, e.g. a joint research proposal, position, formulation of a concept, project, article, video, or solution of an actual problem in practice. For encounters to fulfil their purpose of doctoral student education, according to Briddle et al. (2013, pp. 26–29) they require the facilitating leadership of someone who is capable of assuming the role of a mediator, so as to maintain focus, maximize creativity, develop confidence and self-confidence, build in frequent reflection moments, and foster appreciative inquiry.

The prevailing form of building doctoral students' inter-disciplinarity is setting up supra-disciplinary institutions and structures for the education of beginning researchers – university, supra-faculty, or thematic doctoral schools. These bring together doctoral students of various disciplines with the aim of producing a critical mass for research with sufficient diversity. There is a desire to de-privatize doctoral studies from the Humboldtian “master – apprentice” model to a model with the broad support of doctoral students from a team of supervisors from various disciplines, in order to develop transversal competencies.

Research on inter- and trans-disciplinarity in doctoral studies

Inter-disciplinarity itself has become a strong interdisciplinary research theme, with a number of research or evaluation reports by universities examining the benefits of exposing doctoral students' to inter-disciplinarity.

Carr et al. analyzed research to find conditions needed for the development of interdisciplinary collaboration. This prospered if researchers acknowledged and analyzed differences between disciplines, recognized limitations to their own mono-disciplinary approach, if they were able to communicate their research in a way that people from other disciplines understood it, if they were disposed to discuss and re-explain their approach until all involved in the discussion understood it, if they managed potential sources of conflicts arising from different ideas and minimized obstacles to constructive collaboration, and if they were disposed to negotiate compromises to reach a consensus. Regular face to face interaction, mutual trust, and a central figure who facilitated connectivity and collaboration between researchers appeared effective, too (Carr et al., 2018,

Table 2. Benefits of the interdisciplinary approach for students

Cognitive development and learning	Critical thinking and independence	Duerr, 2008 Open University, UK
	Analysis of a theme from other points of views, ability to ask innovative questions	Bridle et al., 2013 Darbellay, 2015
	Synthesis of thoughts from many perspectives	Duerr, 2008 Open University, UK
	Creativity and flexibility	Nissani, 1997 Open University, UK
	Meaningful, authentic, purposeful, deeper and life-long learning	Duerr, 2008 Open University, UK
	More original knowledge, understanding of relationships between areas	Castán Broto et al., 2009 Nisani, 1997 Duerr, 2008 Carr et al., 2018
	Connection with real-world contexts	Duerr, 2008
	More intense educational experience, higher motivation	Jones, 2010 Open University, UK
	Development of transferable and social skills	Ability to work in a team, tolerance, communication skills
Understanding people, abilities to look at situations from their points of view		Duerr, 2008 Jones, 2010 Graybill et al., 2006
Self-confidence		Duerr, 2008
Understanding of the broader impact of one's own area of knowledge on society		Bridle et al., 2013
Ethos of respect for other disciplines		Castán Broto et al., 2009
Practical advantages in the career	More available financing for research on complex problems	Bridle et al., 2013
	Increased potential for participation in research, identification of a researcher in other disciplines	Bridle et al., 2013

Source: own work

pp. 37–38). According to evaluation by students of interdisciplinary doctoral studies, active participation in joint research, work and activities and joint supervision by supervisors from more disciplines were of the highest benefit. Shared offices, joint courses, social events and interdisciplinary study programmes were of some benefit. A neutral or low benefit was reported for seminars/lectures with experts from various fields (Carr et al., 2018, p. 44).

Discussion

Clearly the inter-disciplinarity and trans-disciplinarity of Ph.D. studies are developing rapidly in the world. However, there may be misconceptions in the understanding of inter-disciplinarity due failure to recognize two levels of inter-disciplinarity. Mono-disciplinary-oriented scientists frequently incorrectly consider inter-disciplinarity to be only an interdisciplinary approach inside a certain science. This misconception sees it as studying the subject of science from the point of view of more disciplines with the aim of training a researcher inside the discipline, who is able to produce new knowledge of his/her own discipline by applying knowledge from other disciplines. In real interdisciplinary research, the subject of the research does not belong to any distinct science, but encompasses complex problems that cannot be addressed by one discipline. The aim is to train an inter-disciplinarian who thinks across disciplines and produces research which goes beyond their borders. Other limitations, mentioned by Darbellay (2015, p. 167) include a lack of conceptual thinking in the area of interdisciplinarity, and conformity to a common practice. Interdisciplinary cooperation is often considered as something automatic when designing research projects involving scientists from various disciplines; it is not thought out or discussed.

The above-mentioned issues are also reflected in interdisciplinary studies. According to Jones (2010), due to the high popularity of interdisciplinary studies, in the effort to win students, interdisciplinary doctoral programmes frequently consist of various courses thoughtlessly piled up in a curriculum, sacrificing quality interdisciplinary strategies and methodology. If the course curriculum is reduced to “specialization” in a discipline, students have no synthesis of a broad range of disciplines. Jones also criticises the fact that when doctoral students are supervised by a team of supervisors from various disciplines responsibility is not always clearly defined (2010, p. 79).

As pointed out by Saari & Moilanen (2012, p. 99), universities must strategically manage the development of inter-disciplinarity. They should purposefully stimu-

late interdisciplinary research, form and develop interdisciplinary research communities, through the creation of strategic plans, integration of research themes, professionalization of interdisciplinary workplaces, networking, interdisciplinary studies and events. According to Saari & Moilanen (ibid.) this requires good management by consensus of interdisciplinary research workplaces and teams, development of effective mutual understanding and communication of academic disciplines with each other as well as with interdisciplinary teams and institutions. In their view, a clear sign of maturity is synergy in the exploration of a theme from various perspectives, team collaboration, co-authorship and regular evaluation of the development of inter-disciplinarity.

Other authors, also emphasize the need for fruitful interaction between academic disciplines and interdisciplinary research. Mono-disciplinary institutions (academic disciplines, or departments) appear inevitable, as the integrity of monodisciplinary traditions is important for interdisciplinary research, because interdisciplinary research occurs only with reference to disciplines. They produce sources of knowledge and provide a common ground for communication with colleagues. They serve as reference points because research is also innovative in that it challenges the customary conventions of the discipline (Castán Broto et al., 2009).

A vibrant community of scholars, just like a thriving ecosystem, nurtures specialists and generalists, diversity and interconnections (Nisani, 1997, p. 213).

Conclusion

Despite the fact that the next period of science development will belong to inter/trans-disciplinarity, the answer to the question whether to lead doctoral students to careers as interdisciplinary scientists is complex. Interdisciplinary scientists encounter dilemmas and cultural barriers caused by an environment that is monodisciplinary, which leads them to career obstacles, and difficulties in qualification growth, or access to job positions that are organized by disciplines/fields. Orientating towards interdisciplinary research may remove a doctoral student from the latest knowledge in his/her own discipline, interdisciplinary studies focus on “fringes” of a discipline, which lowers an academic’s reputation in the eyes of his/her peers. Learning from other disciplines, and making reasonable connections between them, requires maturity and intellectual energy which threatens research in its initial phase. Interdisciplinarians – must overcome their colleagues’ resistance to change. The greatest obstacle is the monodisciplinary

oriented thinking of academics, who are suspicious of people that do not have a firm anchor in any discipline, and reject the idea of an interdisciplinary scientist who, in contrast to a specialist, has no complete mastery of his/her broad research field and risks “dilettantism to gain her bird’s eye view” (Nisani, 1997, p. 212).

References

- Bridle, H., Vrieling, A., Cardillo, M. Araya Y. & Hinojosa, L. (2013). Preparing for an interdisciplinary future: A perspective from early-career researchers. *Futures* 53, 22–32.
- Borrell-Damian, L., Morais R and Smith, J. H. (2015). *Collaborative doctoral education in Europe: Research partnerships and employability for researchers: Report on DOC-CAREERS II Project*. Brussels: EUA.
- Carr, G., Loucks, D. P. & Blöschl, B. (2018) Gaining insight into interdisciplinary research and education programmes: A framework for evaluation. *Research Policy*, 47(1), 35–48.
- Castán Broto, V., Gislason, M. & Ehlers, M. H. (2009). Practising interdisciplinarity in the interplay between disciplines: experiences of established researchers. *Environmental science & Policy*, 12(7), 922–933.
- Darbellay F. (2015). Rethinking inter- and transdisciplinarity: Undisciplined knowledge and the emergence of a new thought style. *Futures* 65, 163–174.
- Duerr, L. L. (2008). Interdisciplinary Instruction. *Educational Horizons*, 86(3) 173–180.
- Gibbons M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P. & Trow, M. (1994). *The new production of knowledge: the dynamics of science and research in contemporary societies*. Thousand Oaks, CA, US: Sage Publications.
- Graybill, J.K., Dooling, S., Shandas, V., Withey, J., Greve, A. & Simon, G. L. (2006) A rough guide to interdisciplinarity: graduate student perspectives. *Bioscience* 56(9), 757–763.
- Hasgall, A., Saenen, B. & Borrell-Damian, L. et al. (2019). *SURVEY Doctoral education in Europe today: approaches and institutional structures*. Geneva: EUA-CDE.
- Hicks, C. C., Fitzsimmons, C., Polunin, N. V. C. (2010) Interdisciplinarity in the environmental sciences: barriers and frontiers, *Environmental Conservation* 37(4) 464–477.
- Huutoniemi K., Thompson Klein, J., Bruun, H. & Hukkinen, J. (2010). Analyzing interdisciplinarity: Typology and indicators. *Research Policy* 39(1), 79–88.
- Jones, C. (2010) Interdisciplinary Approach – Advantages, Disadvantages, and the Future Benefits of Interdisciplinary Studies. *ESSAI*, 7(1), 76–81.
- Louw, J. & Muller, J. (2014). *A Literature Review of Models of the PhD*. Retrieved from: https://www.idea-phd.net/images/docpdf/Louw_and_Muller_2014_Literature_Review_on_Models_of_the_PhD.pdf
- Mareš, J. (2013). Přehledové studie: jejich typologie, funkce a způsob vytváření. [Review Studies: their Typology, Function and Method of Creation]. *Pedagogická orientace*, 23(4), 427–454.
- Matas, C. P. M. (2012). Doctoral Education and Skills Development: An International Perspective. *Revista de Docencia Universitaria*, 10(2), 163–191.

- Nissani, M. (1997). Ten cheers for interdisciplinarity: The case for interdisciplinary knowledge and research *The Social Science Journal*, 34(2), 201–216.
- Saari, S. & Moilanen, A. (eds.) (2012). *International evaluation of Research and doctoral Training at the University of Helsinki 2005–2010*. Helsinki: University of Helsinki, Administrative Publications 81.
- Taylor, S., Kiley, M. & Humphrey, R. (2018). *A Handbook for Doctoral Supervisors*. London, New York: Routledge World Economic Forum. (2016). *The Future of Jobs, Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*. Available on: http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf
- World Economic Forum. (2018). *The Future of Jobs Report*. Available on: http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf

Reading Preferences of Younger Learners in Slovak-Czech-Polish Comparison

DOI: 10.15804/tner.2020.61.3.03

Abstract

The aim of the study was a comparative analysis of reading preferences of elementary school younger learners in Slovakia, Czech Republic and Poland. A questionnaire of own design was used, based on an initial exploration by means of focus interviews. Respondents were divided by their reading levels. The research sample consisted of 693 Slovak, 254 Czech and 248 Polish learners. Findings indicated similarities, but also considerable differences offering a possibility to draw knowledge on international research of learners' reading preferences. The most important finding was the difference of the Polish sample correlating with the best results of Polish learners in international measurements.

Key words: younger learners, learner reading preferences, international comparison of results, learners' reading in Slovakia, Czech Republic and Poland.

Introduction

Reading is considered an indicator of educational results and a requirement of lifelong education. Reading as a research variable is closely connected with reading literacy. The National Strategy for Increase of Level and Continuous Development of Reading Literacy (2016) identifies weaknesses in the development of reading literacy: a lack of strategy for its development at many levels. There is a lack of research into related phenomena. Our investigation pursued reading preferences of 10-investigation to 11-year-old learners. International comparison should

answer the questions about how the preferences of Slovak, Czech and Polish children differ. Comparison in the PIRLS measurements of learners' reading literacy in the countries studied shows an apparent shift of Polish learners from the 29th to the 6th place over 10 years. The rise is considered an excellent result. Genres and contents in reading preferences of younger learners change. The results of our research (Babiaková, Kasáčová, 2019) show that younger learners prefer stories from children's lives, fantasy and sci-fi literature more than in the past. In contrast to the 20th century, today's children prefer mainly translated literature as their leisure-time reading. The character of the preferred literary hero changes, too. The authors of other researches have arrived at similar findings.

R. Natov (2017) focuses on the way children's imaginative engagement with the child hero figure can open them up to other people's experiences, developing empathy across lines of race, gender and sexuality.

Already in 2003, B. W. Sturm in his research in North Carolina analyzed two thousand open-ended answers from children 2 to 18 years old. The results indicated the following trends in reading preferences. Younger children preferred themes such as: animals, science, sports, and literature; older children opted for, biography, history, computer, careers, the library collection, and transportation (Sturm, 2003).

According to the Australian research (Australian Kids and Family Reading Report, 2016), the reasons for children's reading preferences can be characterized as follows: they amuse them and make them laugh – 54%; let them use their imagination – 47%; have a mystery or a problem to solve – 42%; have characters children wish they could be like – 38%; tell a made-up story (fiction) – 36%; teach something new – 35%; let them forget about real life for a while – 35%; tell a true, a bit scary story – 28%; they are about things children experience in their lives – 24%; have characters who are in love – 18%; have characters who look like them – 14%. However, other researchers have found out that adults have misconceptions about the reading of young people. Their attention should focus on the meaning of reading in children's lives (Manuel, Robinson, 2002).

Slovakia, Czech Republic and Poland were chosen for the comparison because they are socially and culturally close. Their starting point at the period of curricular reforms was similar. The population density and the average life expectancy in the countries are comparable. A significant difference is that the average number of younger school-age learners per teacher is 10 in Poland, 15 in Slovakia and 19 in the Czech Republic (PIRLS, 2016). This may have an impact on education.

Slovakia achieves approximately the same level in the 5-year PIRLS testing cycles. In 2016 PIRLS measurement of reading literacy, Poland achieved the best

results – 565 scale units, the Czech Republic – 543, and Slovakia – 535 – ranking the lowest of the compared countries (PIRLS 2016). This finding was an inspiration to conceive our research plan.

Methodology of Research

The study presents partial findings of a quantitative-qualitative empirical research¹. It was carried out in three phases:

Phase 1 of the problem initial exploration was carried out by focus interviews with relevant participants. The focus interviews resulted in the formulation of grounded theory that there are three determinants in children's reading: a) personality context, b) social context, c) individual reading preferences. Next, four levels of readers were identified based on their personality characteristics: A, I, G, N:

- Enthusiastic Readers A – actively seeking books, choosing literature consciously, and who prefer reading in their leisure time.
- Interested Readers I – can choose texts according to their own interest; cope with compulsory learning texts without difficulties. They need advice, help and motivation to read.
- Non-Readers without Problems G – they are indifferent, not “illiterate”, they can read; they do not read of their own will or interest.
- Non-Readers with Problems N – they have serious difficulties with literacy and they find reading stressing and upsetting. When they do not have to, they do not read, when they have to, they suffer a lot.

Phase 2 consisted in designing and using a structured research tool and obtaining research data. Basic tests divided respondents into four reading levels A, I, G, N.

Phase 3 focused on two comparison types: ontogenetic comparison of 10- and 13-year-old respondents and international comparison of three national samples. The study presents the results of the international comparison of younger learners' statements about their reading choices in terms of genres, contents and formats.

Research sample

All three national groups of respondents (N 1195) were divided depending on how assigned to reader sub-groups by the criteria of the second group of items.

¹ This text was created under the project VEGA No. 1/0455/18 titled „Research and Development of Reading Enthusiasm with Younger School-Age Learners”, principal investigator doc. PaedDr. Simoneta Babiaková, PhD.

The research sample was obtained by convenience sampling initiated by direct contacts with teachers or through interested students. The limit was class teachers' willingness to participate in the research.

Table 1. Characteristics of the Slovak, Czech and Polish samples

4 th Grade	A Enthusiastic Readers		I Interested Readers		G Non-Readers without Prob- lems		N Non-Readers with Problems		Total N %	
	n	%	n	%	n	%	n	%	n	%
SK	309	44.59	268	38.67	110	15.87	6	0.87	693	100
CZ	76	29.97	120	47.24	54	21.26	4	1.58	254	100
PL	46	18.55	114	45.97	82	33.06	6	2.42	248	100

Methods

A questionnaire, designed on the basis of qualitative research, was used. The first group of items compiled data about respondents and schools whereas the second group of items determined readers' characteristics. The items distributed respondents to four reader sub-groups (A – Enthusiastic Readers, I – Interested Readers, G – Non-Readers without Problems, N – Non-Readers with Problems). The third group of items pursued the social context of respondents' reading, and the fourth their reading preferences. The initial analysis of research findings of a descriptive character about reading preferences in the national groups identified phenomena that were subsequently statistically tested. Since they were categorical variables, hypotheses were tested using Pearson's chi-squared goodness of fit test. All combinations of national pairs were compared. Statistical data are presented where a statistical significance was determined. Partial comparison used extreme values.

Research questions:

- What are the national groups' specifics in terms of the preferred literary genre?
- How do the national groups differ in their content preferences?
- What are the differences between the national groups in their preferences of texts enriched by illustrations?
- Which of the national groups prefers audio-books over reading books?
- Are there differences between the national groups in their preferences of reading formats other than printed books?

- How do the national groups differ in their preferences of reading books over watching films?
- How do the national groups differ in their relationships to extra reading?

Results of research

We were interested in the **preference of literary genres**. We asked whether there were significant differences between pairs of the national groups. Three hypotheses were formulated. They were tested by Pearson's chi-squared goodness of fit test because of the measuring method in the given hypothesis item.

H1: It is assumed that there is a difference between PL and SK respondents in their choice of literary genres. The biggest difference showed in the overall comparison of Polish and Slovak learners' preferences of literary genres ($\chi^2 = 66.95758$ df = 6 p = 0.000000).

H2: It is assumed that there is a difference between PL and CZ respondents in the choice of literary genres. Also significant, but a little smaller difference showed between Polish and Czech learners ($\chi^2 = 23.07295$ df = 6 p = 0.000773).

H3: It is assumed that there is a difference between SK and CZ respondents in the preference of literary genres. Comparison of the Slovak and the Czech sample showed differences, however of lower significance ($\chi^2 = 20.04246$ df = 6 p = 0.002722).

In terms of preferred literary genres, Polish children differed from Czech and Slovak children. They read less fairy tales and considerably more poetry, short stories novels. It is explained by the fact that Polish literature focuses on children's prose both from the present and from Polish history (Konopnicka, 2013). Czech learners chose poetry the least of all groups. Slovak children preferred encyclopaedias and short stories less than Czech and Polish children (Table 2).

Qualitative analysis of actual titles was published (Babiaková, Kasáčová, 2019).

Table 2. Preferences of genres

Genre	Q I most like to read						Write their titles %	N /% in national groups
	Fairy-tales %	Short stories %	Novels %	Encyclo-paedias %	Poems %	Other %		
A	32.88	8.71	6.61	18.02	11.11	13.81	8.86	309
I	33.88	5.75	4.52	19.92	9.45	12.94	13.55	268
G	32.57	7.43	5.14	16.57	8.57	17.71	12.00	110

Q I most like to read								
Genre	Fairy-tales %	Short stories %	Novels %	Encyclopaedias %	Poems %	Other %	Write their titles %	N /% in national groups
N	44.44	11.11	11.11	11.11	11.11	11.11	0.00	6
SK	33.28	7.48	5.68	18.47	10.17	13.99	10.92	693/100
A	28.57	18.05	9.77	9.77	5.26	15.79	12.78	76
I	33.16	14.74	6.32	8.42	6.84	18.42	12.11	120
G	32.84	8.96	4.48	5.97	4.48	31.34	11.94	54
N	28.57	0.00	0.00	14.29	14.29	28.57	14.29	4
CZ	31.49	14.61	7.05	8.56	6.05	19.90	12.34	254/100
A	14.81	19.44	15.74	5.56	16.67	17.59	10.19	46
I	20.67	22.60	11.54	4.81	17.79	14.42	8.17	114
G	21.37	15.38	5.13	2.56	22.22	17.95	15.38	82
N	30.00	20.00	10.00	10.00	10.00	20.00	0.00	6
PL	19.64	19.86	10.84	4.51	18.51	16.25	10.38	248/100

A Enthusiastic Readers, I Interested Readers, G Non-Readers without Problems, N Non-Readers with Problems

The content categories arose from categorization on the basis of focused interviews. They were the basis for creating the structure in the item: “What do you like most to read about?” The most frequently chosen content was *real life stories* – they were reported by Polish learners less than by Slovak and Czech learners. *Fantasy and sci-fi* literature was preferred by the most by Czech readers. *Detective stories and biographies* were read the most by Slovak children. Their open-ended answers revealed that they were biographies of current pop-culture, modelling and sport “celebrities”. Magazine articles were read the least by Polish children. Magazines were preferred by Slovak non-readers of the G level, while preferred by Czech interested readers (Table 3).

Table 3. Preferences of contents

Q What I most like to read about								
Genre	Real life stories %	Magazine articles %	Fantasy or sci-fi %	Detective stories %	Biographies %	Other %	Write their titles %	N/% in national groups
A	25.32	9.84	22.10	19.19	11.61	8.39	3.55	309
I	28.79	9.67	19.78	14.95	11.65	9.01	6.15	268

Q What I most like to read about								
Genre	Real life stories %	Magazine articles %	Fantasy or sci-fi %	Detective stories %	Biographies %	Other %	Write their titles %	N/% in national groups
G	25.71	12.00	17.14	13.71	17.71	9.14	4.57	110
N	42.86	14.29	0.00	0.00	28.57	14.29	0.00	6
SK	26.73	10.10	20.45	16.79	12.57	8.75	4.61	693/100
A	28.57	6.72	30.25	18.49	2.52	10.08	3.36	76
I	29.73	12.97	25.41	14.59	7.57	7.57	2.16	120
G	26.23	8.20	36.07	4.92	14.75	4.92	4.92	54
N	20.00	0.00	20.00	0.00	0.00	40.00	20.00	4
CZ	28.65	10.00	28.65	14.05	7.03	8.38	3.24	254/100
A	28.40	2.47	23.46	18.52	7.41	12.35	7.41	46
I	22.78	4.43	30.38	12.03	12.03	12.03	6.33	114
G	17.00	5.00	23.00	14.00	13.00	17.00	11.00	82
N	16.67	16.67	50.00	0.00	16.67	0.00	0.00	6
PL	22.32	4.35	26.96	13.91	11.30	13.33	7.83	248/100

A Enthusiastic Readers, I Interested Readers, G Non-Readers without Problems, N Non-Readers with Problems

Attractiveness of graphically enriched texts was also the subject of our interest.

H4: It is assumed that there are no differences in preferences of books enriched by illustrations.

The assumption was confirmed. There was no statistically significant difference in strong consent between any pair of the national groups. Illustrated and graphically enriched books were equally attractive. They were preferred by readers and non-readers of all groups (Table 4).

Table 4. Attractiveness of graphically enriched texts

Level	Q I am attracted by a book with illustrations, pictures, schemes, graphs or photos.											
	I agree very much			I agree			I do not agree			I do not know how to answer		
	SK %	CZ %	PL %	SK %	CZ %	PL %	SK %	CZ %	PL %	SK %	CZ %	PL %
A	36.89	38.16	36.96	41.75	44.74	32.61	13.27	10.53	19.57	8.09	6.58	10.87
I	28.36	29.17	30.70	43.66	38.33	43.86	13.81	20.00	14.04	14.18	12.50	11.40

G	21.82	25.93	36.59	40.91	33.33	34.15	16.36	18.52	8.54	20.91	22.22	20.73
N	16.67	0.00	16.67	33.33	0.00	33.33	0.00	0.00	16.67	50.00	100.00	33.33
Total	31.02	30.71	33.47	42.28	38.58	38.31	13.85	16.54	13.31	12.84	14.17	14.92

A Enthusiastic Readers, I Interested Readers, G Non-Readers without Problems, N Non-Readers with Problems

Preference of books or e-formats was of our interest in connection with the current reading trends. Respondents preferred printed books over e-formats. They did not care for either e-book readers or iPads. It was evidenced by more than a half of disagreeing answers. However, there was also a high number of answers in the option *I do not know how to answer*, indicating that many children did not know what an e-book reader and iPad is or they had no access to them (Table 5).

Table 5. Preference of books or e-formats

Level	Q I prefer reading in the e-book reader, iPad over reading in books.											
	I agree very much			I agree			I do not agree			I do not know how to answer		
	SK %	CZ %	PL %	SK %	CZ %	PL %	SK %	CZ %	PL %	SK %	CZ %	PL %
A	3.88	3.95	4.35	11.33	6.58	6.52	70.87	73.68	78.26	13.92	15.79	10.87
I	6.72	9.17	7.89	18.66	14.17	7.89	49.25	52.50	56.14	25.37	24.17	28.07
G	5.45	16.67	13.41	17.27	7.41	10.98	47.27	31.48	32.93	30.00	44.44	42.68
N	0.00	25.00	0.00	16.67	0.00	0.00	16.67	0.00	0.00	66.67	75.00	100.00
Total	5.19	9.45	8.87	15.15	10.24	8.47	58.30	53.54	51.21	21.36	26.77	31.45

A Enthusiastic Readers, I Interested Readers, G Non-Readers without Problems, N Non-Readers with Problems

Preference of reading on the Internet was also investigated.

H5: It is assumed that there is a statistically significant difference between the national groups in their preferences of reading Internet sources. The hypothesis was not confirmed (SR vs. PL $\chi^2 = 0.320$; SR vs. CZ $\chi^2 = 1.318$; PL vs. CZ $\chi^2 = 0.346$). There was no statistically significant difference between any pair of the national groups. Most learners in the national groups did not agree with the statement. The preference of reading on the Internet correlated negatively with the reading level in the national group. Already the characteristics of A, I, G, N readers revealed that the higher the reading level the higher the preference of books over other media (Table 6).

Table 6. Preference of reading on the Internet

Level	Q I prefer reading on the Internet.											
	I agree very much			I agree			I do not agree			I do not know how to answer		
	SK %	CZ %	PL %	SK %	CZ %	PL %	SK %	CZ %	PL %	SK %	CZ %	PL %
A	1.94	1.32	8.70	9.71	7.89	6.52	78.96	82.89	76.09	9.39	7.89	8.70
I	12.31	10.83	10.53	16.79	15.00	10.53	51.12	66.67	59.65	19.78	7.50	19.30
G	14.55	22.22	19.51	19.09	25.93	10.98	36.36	27.78	34.15	30.00	24.07	35.37
N	0.00	0.00	0.00	16.67	0.00	16.67	50.00	25.00	16.67	33.33	75.00	66.67
Total	7.94	10.24	12.90	14.00	14.96	10.08	61.18	62.60	53.23	16.88	12.20	23.79

A Enthusiastic Readers, I Interested Readers, G Non-Readers without Problems, N Non-Readers with Problems

Preference of listening to an audio-book over reading

H6: It is assumed that there is a statistically significant difference between the SK and the PL group in their preferences of audio-books. The hypothesis was confirmed in favour of the Polish group ($\chi^2 = 10.220$ df = 3.841 p<0.001). There were considerable differences between the national groups. A descriptive view showed that listening to audio-books was rejected by 64% of Slovak, 53% of Czech and only 34% of Polish readers. Listening was preferred at both levels of consent by more than 45% of Polish and 31% of Czech children (Table 7).

Table 7. Preference of listening to audio-books over reading

Level	Q. I prefer listening to an audio-book over reading it											
	I agree very much			I agree			I do not agree			I do not know how to answer		
	SK %	CZ %	PL %	SK %	CZ %	PL %	SK %	CZ %	PL %	SK %	CZ %	PL %
A	2.59	6.58	4.35	6.47	11.84	10.87	79.29	68.42	65.22	11.65	13.16	19.57
I	10.45	12.50	19.30	10.45	16.67	26.32	60.82	60.83	32.46	18.28	10.00	21.93
G	15.45	33.33	41.46	21.82	18.52	19.51	30.00	20.37	19.51	32.73	27.78	19.51
N	0.00	25.00	33.33	33.33	0.00	33.33	0.00	0.00	16.67	66.67	75.00	16.67
Total	7.65	15.35	24.19	10.68	15.35	21.37	63.64	53.54	33.87	18.04	15.75	20.56

A Enthusiastic Readers, I Interested Readers, G Non-Readers without Problems, N Non-Readers with Problems

Preference of reading over film watching

H7: It is assumed that there are differences between the national groups in their preferences of reading over film watching. The hypothesis was not confirmed. Nevertheless, the differences in the results of the national groups were interesting. 27% of Slovak readers, in the sum of both levels of agreement, preferred reading over watching films, while only 17% of Czech readers and 19% of Polish readers did. The overall Polish sample preferred films in 60%, Czech sample in 66%, Slovak sample in 49%. In all national groups, there was a difference in the level of disagreement especially between enthusiastic readers (A). The Czech sample of enthusiastic readers (A) reported considerably lower strong agreement (9.21%) against the other two samples. The preference of films clearly prevailed in almost 93% of Czech learners who were non-readers without difficulties (G) (Table 8).

Table 8. Preference of reading over film watching

Level	Q I prefer reading books over watching films											
	I agree very much			I agree			I do not agree			I do not know how to answer		
	SK %	CZ %	PL %	SK %	CZ %	PL %	SK %	CZ %	PL %	SK %	CZ %	PL %
A	14.24	9.21	19.57	31.39	31.58	28.26	29.13	35.53	30.43	25.24	23.68	21.74
I	4.10	0.00	2.63	9.70	9.17	11.40	62.31	75.00	60.53	23.88	15.83	25.44
G	2.73	1.85	4.88	5.45	0.00	6.10	73.64	92.59	74.39	18.18	5.56	14.63
N	0.00	0.00	0.00	16.67	25.00	16.67	66.67	25.00	83.33	16.67	50.00	0.00
Total	8.37	3.15	6.45	18.76	14.17	12.90	49.35	66.14	60.08	23.52	16.54	20.56

A Enthusiastic Readers, I Interested Readers, G Non-Readers without Problems, N Non-Readers with Problems

Compulsory and recommended reading

The wording of extra reading differed in the national terminology. While for Slovak and Czech learners it was recommended literature for reading in addition to the school reader, the term *reading in addition to textbooks* was used in the Polish context.

H8: It is assumed that there are significant differences between national groups in the relationship to extra reading. The hypothesis was confirmed. There was a statistically significant difference between the Slovak and the Czech group in favour of Slovak learners ($\chi^2 = 27.800$ df = 3.841 p<0.001). There was a statistically significant difference ($\chi^2 = 16.840$ df = 3.841 p<0.001) between the Polish and

the Czech group in favour of Polish learners. There was no significant difference between Slovak and Polish learners. Czech learners reported the strongest aversion to extra reading (66%). The aversion was rising with the falling level of reading. Slovak enthusiastic readers (A) differed from Czech and Polish readers in the fact that 87% of learners enjoyed reading recommended books. The interest in reading recommended titles correlated with the reading level (Table 9).

Table 9. Compulsory and recommended reading

Level	Q I enjoy extra reading.											
	I agree very much			I agree			I do not agree			I do not know how to answer		
	SK %	CZ %	PL %	SK %	CZ %	PL %	SK %	CZ %	PL %	SK %	CZ %	PL %
A	50.16	9.21	28.26	36.57	31.58	43.48	4.21	35.53	10.87	9.06	23.68	17.39
I	19.40	0.00	21.93	44.03	9.17	48.25	19.40	75.00	10.53	17.16	15.83	19.30
G	9.09	1.85	19.51	27.27	0.00	36.59	30.00	92.59	19.51	33.64	5.56	24.39
N	0.00	0.00	33.33	0.00	25.00	0.00	16.67	25.00	0.00	83.33	50.00	66.67
Total	31.31	3.15	22.58	37.66	14.17	42.34	14.29	66.14	13.31	16.74	16.54	21.77

A Enthusiastic Readers, I Interested Readers, G Non-Readers without Problems, N Non-Readers with Problems

Discussion

We are aware of the limits of our investigation, caused by some methodological phenomena. The national groups were not of the same size; distribution of the reading level inside the samples differed, too. The tool used had a nominal character, which limited the choice of procedures for statistical processing. The strength of the research is in its authentic nature, since the research tool was developed on the basis of the problem initial exploration by a qualitative strategy based on interviews with focus groups of children.

The significance of our research is mainly in the context of international comparison. Investigation of learners' reading, including the view on traditional and modern formats, is important for both modernization of education and everyday life. It presents a fundamental theme in innovation of educational sciences.

There are considerable differences between Slovak, Czech and Polish younger learners. The differences found out by our research certainly have also a wider

social and cultural context. There are significant differences in the preference of literary genres. Polish learners are art oriented and interested in experiential contents, Slovak learners prefer encyclopaedias. However, the results of PIRLS measurements show that Slovak learners' achievement in informational reading is worse than in literary reading. The finding should be examined further. There is also a significant difference in the preference of listening to literary texts (audio-book), preferred by majority of Polish learners. Here, too, their different reading culture is manifested. For decades, many Polish teachers have systematically encouraged children's relationship to reading also by listening to literary texts. Teachers read learners mainly shorter prose at school (Konopnicka, 2013). Yet, the Polish curriculum has the lowest number of instruction hours allotted directly to the mother tongue and literature (PIRLS 2016). Poland has applied the concept of integrated curriculum content in primary education, which could be reflected also in the results of the reading literacy measurement. Reading is the goal and means not only of literature classes but it is incorporated in all subjects.

There is no difference between national groups in their preference of printed books over the Internet sources. All national groups prefer books, which does not support the frequent assertion that generation Z rejected the traditional reading format. All three national groups prefer films to books. A descriptive analysis of the data shows clearly that only enthusiastic readers prefer books to films. All respondents, regardless of their reading levels, are attracted by graphic designs of books. Czech learners resent compulsory reading the most; Slovak and Polish learners approve of it depending on their reading level.

As recommended by W. Martino (2001), when developing learners' reading skill teachers should get inspiration from published researches. It is also the intention of our research findings processed from data from 1200 learners. Information of the scholar community certainly helps to improve the knowledge about children's reading.

References

- Australian Kids and Family Reading Report. Engaging Teens with Reading*, (2016) Retrieved 2019/08/12 from: <https://natlib.govt.nz/schools/reading-engagement/strategies-to-engage-students-as-readers/engaging-teens-with-reading>.
- Babiaková, S. & Kasáčová, B. (2019). „Reading Preferences' Analysis of Slovak Younger Learners “In ICERI 2019 : 12th International Conference of Education, Research and Innovation, Proceedings Included at ICERI 2019 Conference. Sevilla: IATED, 2019, pp. 1356–1363.

- Konopnicka, I. (2013). *Edukacja czytelnicza dzieci w młodszy m wieku szkolnym*. Opole: Uniwersytet Opolski.
- Manuel, J. & Robinson, D. (2002). What are Teenagers Reading? The Findings of a Survey of Teenagers' Reading Choices and Implication of These for English Teachers' Classroom Practice. In *English. In Australia* 135, 2002 – January pp. 69–78. Retrieved 12/08/2019 from: <https://www.researchgate.net/publication/234755295_What_Are_Teenagers_Reading_The_Findings_of_a_Survey_of_Teenagers'_Reading_Choices_and_the_Implications_of_These_for_English_Teachers'_Classroom_Practice>.
- Martino, W. (2001). Boys and Reading: Investigating the Impact of Masculinities on Boys' Reading Preferences and Involvement in Literacy. *Australian Journal of Language and Literacy*, Volume 24, No. 1, pp. 61–74 Document Type: Journal Article
- Národná stratégia zvyšovania úrovne a kontinuálneho rozvíjania čitateľskej gramotnosti* (2016). (National Strategy for Increase of Level and Continuous Development of Reading Literacy), Retrieved 25/03/2020: http://zsss.stranka.info/stranky/zsss/F/subory/cg_narodnastrategia.pdf?PHPSESSID=b42aa96b4144705d00361c5218a63ff5
- Natov, R. (2017). *The Courage to Imagine. The Child Hero in Children's Literature*. Bloomsbury Academic, Series: Bloomsbury Perspectives on Children's Literature. London, New York, Sydney and New Delhi. Retrieved 30/03/2020: <https://www.bloomsbury.com/uk/the-courage-to-imagine>
- PIRLS (2016) *International Results in Reading*. Retrieved 12/03/2020: <http://pirls2016.org/pirls/student-achievement/pirls-achievement-results/>
- Sturm, B. W. (2003) The Information and Reading Preferences of North Carolina Children *School Library Media Research (SLR)* Volume 6, pp. 1–19. Retrieved 25/03/2020: http://www.ala.org/aasl/sites/ala.org.aasl/files/content/aaslpubsandjournals/slr/vol6/SLMR_InfoReadingPreferences_V6.pdf.

Ida Rindaningsih
Indonesia

*Punaji Setyosari, Dedi Kuswandi,
Saida Ulfa*
Indonesia

Development of Seamless Learning to Facilitate Formal and Informal Learning in Elementary Education

DOI: 10.15804/tner.2020.61.3.04

Abstract

Environmental education in primary schools has not built sufficient awareness in formal-informal learning experience. The development of seamless learning is an alternative innovation in building students' learning experiences. However, there is limited research on its implementation in the learning process in elementary schools with limited mobile technology. Therefore, the purpose of this research was to develop instructional design and learning planning matrices for seamless learning on teachers' and students' activities to facilitate formal and informal learning with limited use of mobile technology in elementary schools. Based on the instructional design and learning planning matrices developed, the context reconstruction in a seamless learning design was successfully used in guiding the teachers' and students' activities. The limitations of mobile technology in the schools could be replaced with the use of learning laboratories, as well as parents' support at home. Furthermore, the instructional design and learning matrix developed were feasible, valid, and practical in application in elementary schools. Therefore, the community has a vital role to play in improving students' learning experiences aside from schools.

Key words: *instructional design, learning planning matrices, learning activity, mobile technology.*

Introduction

Environmental education could improve students' awareness and appropriate behaviour towards nature. Environmental education could be integrated into school curricula as an independent subject in the formal education system. This integrated approach has been used in some countries such as Uganda, China, Finland and New Zealand (Bian, 2004). The approaches used in integrating environmental education into school curricula vary widely, such as its integration into subject matter, parents' involvement, etc. (Sureda-Negre et al., 2014). Education system teaches students to live in a way which promotes sustainable ecological balance. Similarly, the Ministry of Environment and Forestry, together with the Ministry of Education in Indonesia, implemented the "Adiwiyata" school development programs to sustain this initiative. An Adiwiyata School means a school that cares for and loves the environment. Lack of love for the environment is due to low or non-existent awareness in schools and homes. Learning about caring for the environment at school could also be enhanced at home through the support of parents, families or the community at large.

Additionally, technological limitations are a major problem in environmental education. Most teachers are not skilled in utilizing the facilities available to support quality learning, while inadequate facilities are another major problem, hence the need to for links between learning activities inside and outside the classroom. This is supported by the seamless learning method developed by Sun & Looi, 2019; Zhang & Looi, 2011. This seamless method is an alternative in bridging between formal and informal learning. According to Wong & Looi (2011), this method is developing rapidly with 10 layers of Mobile Seamless Learning. In addition, some developed countries have shown the importance of the seamless method as a multifaceted learning effort across several spaces at all education levels in general knowledge, language, science, and mathematics using advanced technological tools (Amhag, 2017; Song, 2018).

Problem of Research

Seamless learning has provided a platform for researchers to develop different concepts, yet it still leaves some problems, such as accumulation of experiences and the improvement of learning interventions inside and outside of school (Song & Kong, 2014). Recent research has reported the lack of adequate explanation on each level of Mobile Seamless Learning (MSL) capable of improving learning experiences of students. Furthermore, there is a need to develop the theory foundation obtained as a concept in each layer of MSL. Wong (2013) stated the main

characteristics of using mobile learning are as follows; (a) mobility, where learning is moving and not fixed in a physical location and (b) personalization, in which learning is more personal in a context which is being continuously reconstructed. According to Dilger et al. (2019), educational designers are needed in the learning process to create specific objectives in each layer of the MSL dimension.

Research Focus

Based on the explanations above, it can be concluded that research into the development of seamless learning focused on the instructional design, including learning planning matrices has not been done in the formal and informal dimensions. Also, educational design research in authentic contexts and learning evaluation is a vital part of teacher and student activities based on the curriculum. According to Auguste, Kihn, & Miller (2010), it is important for teachers to have freedom in planning class trials in achieving learning goals in elementary education. The purpose of this research aims at developing instructional design and learning planning matrices for seamless learning in teachers' and students' activities to facilitate formal and informal learning with limited use of mobile technology in elementary schools.

Methodology of Research

General Background of research

This research is a type of developmental research. Seamless learning for elementary school students was developed on the material "Love the Environment" in the natural sciences. The development of seamless learning is conducted by constructing the instructional design, and then proceeded with constructing learning planning matrices. It is focused on the development of teacher and student activities, thereby enhancing learning in both formal and informal settings. The elementary school provided a representative learning environment and facilities such as laboratories, computer rooms, libraries, school health unit rooms, etc. In addition, students could make use of mobile or computer facilities with parents' assistance to browse, download, take pictures, make videos and upload assignments. Seamless learning was developed through several components such as space, time, context, community, cognitive tools and artifacts (Seow et al., 2008). The researcher used these components to construct instructional design for the teachers' and students' activities, both in formal and informal contexts, thereby implementing it in elementary school learning. This formal and informal seamless

learning instructional design was based on the basic pedagogical theory and took into consideration conditions in elementary school.

Instrument and Procedures

The instruments for testing instructional design development using the seamless learning component is listed in Table 1.

Table 1. Instruments for developing instructional design on seamless learning

Seamless Component	Definition	Development of instructional design
Space	Students are capable of moving seamlessly between different spaces physically and virtually.	Displaying Student Activities in the Classroom – in the Learning Laboratory – and at home with the support of Mobile Technology.
Time	Extending the task completion time helps to build understanding up to the point of analyzing through communication and collaborative efforts	The length of time needed in building knowledge could be spent in the Classroom, in the Learning laboratory, in the Home supported by Mobile Technology based on each student's respective abilities until evaluated by the teacher
Context	The ability of students to complete tasks both in class, in the laboratory and at home using their respective strategies	Independence and strategies to complete tasks starting from the Classroom – Learning Laboratory – home and with the support of mobile technology in accordance with their respective abilities
Community	Communities in a seamless learning environment consist of students, teachers, and community-based knowledge forum, showing how individuals contribute to building knowledge in the community. This basically involves the parents and the whole community	The community generally contributes to the learning process in the laboratory and at home, both online and offline utilizing all available resources.
Tools	Smartphone as a tool to measure cognitive knowledge	Computers at the learning laboratory in school and at home
Artifacts	Suitability of student work	Evaluation of learning outcomes or artifacts with presentations
Overall Design	The processes involved during the learning in class, laboratory, and at home	Overall formal and informal image of the instructional design

In this research, the procedures of seamless learning instructional design were adapted from stages proposed by van den Akker (2013), that is, include preliminary investigation; theoretical embedding; empirical testing; documentation, analysis, and reflection on process and outcome (See Table 2).

Table 2. Stages of development research

Development Stage	Research Activity
Preliminary investigation	a. Reviewing the seamless learning literature <ul style="list-style-type: none"> • Seamless learning component • Seamless Learning and Mobile Seamless Learning Study • Formal and informal learning activities b. Analysis of needs and problems in elementary school c. Analysis of gaps in formal and informal learning experiences
Theoretical embedding	A more systematic effort to apply the theoretical knowledge base in the designs. Also, the instructional designs of teacher and student activities on seamless learning (MSL) dimension 1 were developed by the researchers.
Empirical testing	Empirical evidence to show practicality and effectiveness through validation of instructional design of the teaching material „Love the Environment” by experts and practitioners.
Documentation, analysis, and reflection on process and outcome	Systematic documentation, analysis and reflection are carried out on the overall design. The evaluation and implementation of the results contribute to the expansion and specification of design and methodologies.

Data Analysis

The qualitative and quantitative data obtained were subjected to analysis. Qualitative data analysis was performed on data in the form of criticism and suggestions from experts, while quantitative data analysis was carried out in the form of scores on each instrument item. Internal validity was tested through the expert review of five people with theoretical expertise and practical experience in instructional design. These were made up of three design experts from Electrical Engineering, Educational Technology, and Educational Science, while the remaining two were teachers with decades of teaching experience in grade 4 elementary schools. The experts evaluated the teachers' and students' activities based on seamless learning using a Likert scale: 5 (strongly agree); 4 (agree); 3 (neutral); 2 (disagree); 1 (strongly disagree). In this research, the feasibility of the design was determined by a minimum value of „good“ from the experts and education practitioners. This was conducted, so that the instructional design developed could be considered feasible for applying in learning.

Results of Research

Preliminary investigation and theoretical embedding

This instructional design was developed based on components of seamless learning, with formal and informal activities. The learning processes in these two stages are further divided into four sub-sections, which include; classroom, learning laboratories, outside the classroom (home), and evaluation. Each sub-section was assessed for its achievements using Bloom's taxonomy (Anderson et al., 2001). Additionally, the cognitive achievements of each student varied according to their abilities. Each section also shows the activities of teachers, students, parents as well as the role of technology (See Figure 1).

Formal Learning Stage

The classroom is the initial stage, which continues in the learning laboratory. The teacher acts as a facilitator and motivator, with the primary role of coordinating the learning process. The class time is 30 minutes in which students interact with the teacher using the material, group division and laboratory assignment. In addition, the teacher arranges the seamless learning plan and students are motivated to learn independently, by reading a series of materials, discussing within groups, sharing and completing assignments. In this classroom stage the aim is to build C1 and C2 cognitive abilities (see Table 4 below).

Learning laboratories support students in exploring and building their knowledge. The student activity in building C2 and C3 abilities (see Table 4 below) happen in this place, where students are directly connected with the learning resources and the environment. Learning laboratories could also be computer rooms, school environments, and include visits to learning resources such as museums, factories, etc. The teachers act as motivators and monitor student activities. Meanwhile, students work based on assignments, explore, search for information, discuss, and organize all the tasks. The teachers are also responsible for motivating and guiding students who have difficulty in organizing the given assignments. Students are obliged to sort out uncompleted tasks and complete them at home.

Informal Learning Stage at Home

This is the learning phase outside the classroom, where students continue with activities not yet completed while in the learning laboratory. These activities could be in the form of observations, experiments, analysis, discussion with friends online and offline, documentation of activities, and uploading of assignments based on the achievements of C3, C4, and C5 (see Table 4 below). During this

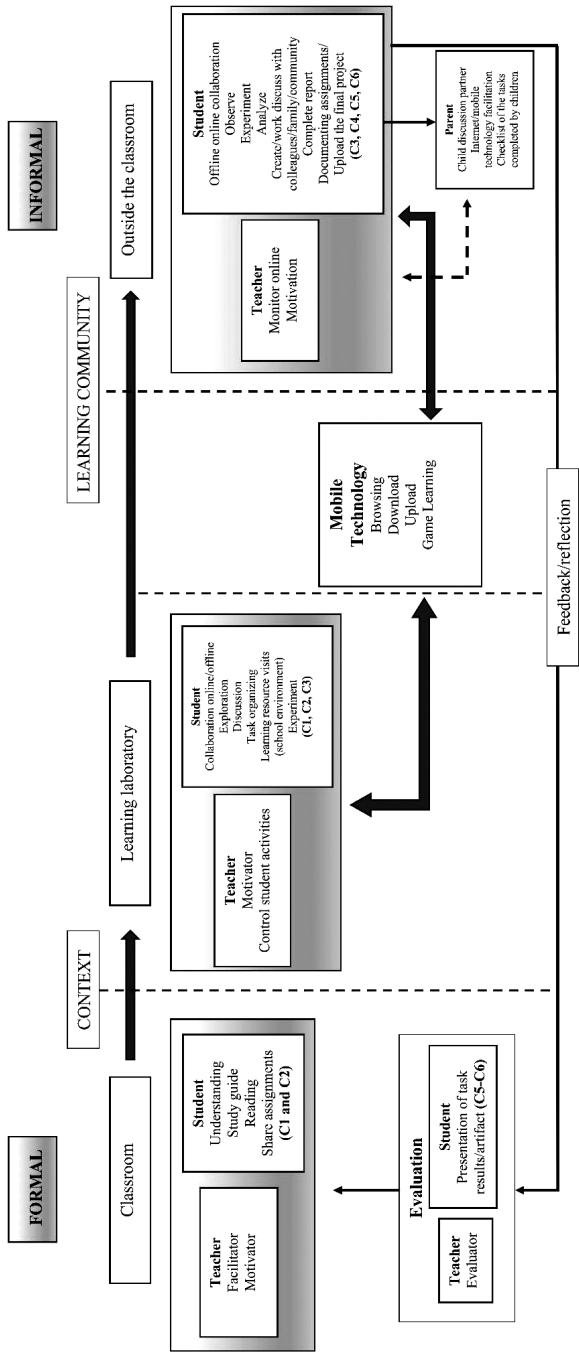


Figure 1. Seamless learning instructional design for formal and informal learning activities

informal learning, students interact with family members and the community at large. Parents could facilitate student activities with mobile technology and provide learning environments capable of supporting the completion of given tasks. Parents are also required to have a checklist that shows all the tasks to be completed. Teachers' main tasks are only to monitor the students' activities online and they are not directly involved in activities outside the classroom. Additionally, parents act as learning information controller who are not allowed to be directly involved in completing the tasks. Hence, students' achievements could be different based on the child's ability.

Evaluation Stage

The teacher evaluates the completed tasks, thereby allowing the students to reflect and understand their strengths and weaknesses based on the assignments. Evaluation activities are the presentation of artifacts produced by students during building knowledge and experience. Evaluation is outside the classroom learning, and students submit the parents' checklists of all the tasks. This is the final activity in a series of previous ones, such as students' class activities, learning in the laboratory, out-of-class activity, as well as parents' guidance.

Empirical Testing

According to the validator, continuous learning has the capacity to provide students with high-quality learning experience. The students do not only depend on materials such as textbooks but most importantly learn to be able to manage themselves to complete the given tasks. In addition, tasks uncompleted in school were continued at home until school resumed. Based on the validator's suggestion, during implementation, there is need for the researchers to prepare a seamless learning activity guide for teachers and parents. Furthermore, its implementation should be able to guarantee a learning model which could be utilized by schools in facing the industrial revolution 4.0. The validation results for the instructional design of teachers' and students' activities based on seamless learning is shown in Table 3.

Table 3. Results of Validation by Design Experts

Component	V1	V2	V3	V4	V5	Average	Category
Space	4.7	4.3	4.7	4.3	4.3	4.5	Very Good
Time	4.5	4.3	4.3	4.3	4.5	4.4	Very Good
Context	4.3	4.5	4.5	4.5	4.3	4.4	Very Good

Component	V1	V2	V3	V4	V5	Average	Category
Community	4.4	4.6	4.6	4.6	4.4	4.5	Very Good
Cognitive Tool	4.7	4.7	4.3	4.7	4.3	4.5	Very Good
Artifact	4.6	4.6	4.6	4.4	4.4	4.5	Very Good

Table 3 shows that the components were given very good values. Based on the results the teachers' and students' activities in seamless formal and informal learning are valid and could be implemented as instructional designs according to the suggestions and criticisms of experts.

Table 4. Seamless learning matrix steps for formal and informal learning activities

Classroom	Laboratory learning	Outdoor learning	Evaluation
Teachers			
<ul style="list-style-type: none"> • Prepare the learning facilities • Preparing Learning Modules • Prepare the project 	<ul style="list-style-type: none"> • Preparing interactive video, learning video, education game, PowerPoint slides, etc • Motivator 	<ul style="list-style-type: none"> • Motivator 	<ul style="list-style-type: none"> • Prepare assessments, both verbal and non-verbal tests • Assess and provide feedback
Students			
C1-C2	C2-C4	C3-C6	
<ul style="list-style-type: none"> • Understand study guides • Organize tasks that are both offline and online • Discuss with teachers and friends 	<ul style="list-style-type: none"> • Read material in e-books / modules / online teaching • Complete individual and group tasks according to ability and understanding • Look for information in learning resources with support from parents 	<ul style="list-style-type: none"> • Access learning resources (learning videos / games / museums / community) • Undergo the process of exploration to experimentation • Complete tasks independently with or without mobile technology • Build collaboration • Report by uploading videos, photos, works, etc. • Discuss with parents / friends / community 	<ul style="list-style-type: none"> • Presenting works / results • Completing tasks, either online or offline
Parents			
Being a good discussion partner Providing smartphones / devices proportionally when needed Giving support and motivation			Making checklist for task completion

Documentation, analysis, and reflection on process and outcome

Based on the results, the context reconstruction in a seamless learning design has the capacity to guide the activities of teachers and students. The limitations of mobile technology in schools could be solved through a learning laboratory and parents' support at home. The researchers continued with the development of the seamless learning matrix steps for formal and informal learning (Table 4). This matrix was key in the effectiveness of teacher and student learning activities.

Discussion

The use of instructional design and learning planning matrices is vital in elementary schools considering the fact that it accommodates the needs of teachers and students. According to Ersoy & Sever (2019), it provides students with learning alternatives at the elementary level, thereby predicting the possible outcomes of their choices. The learning activities of teachers and students have clear cognitive outcomes ranging from C1 to C5 (see Table 4 above). One of the advantages of learning a planning matrix is the fact that it clearly shows teachers' and students' activities in formal-informal learning. This helps to sustain the learning and continues it at home. The limitations in the use of technology in schools could be replaced by maximizing the learning in laboratory and at home.

According to Mosvold & Bjuland (2011), learning space is an environment where students are subjected to various experiences in relation to learning objects and the theories' core concepts. Also, the role of parents in the whole process is to support the students in developing their abilities. There is need for the learning environment to have a seamless relationship with the community and learning resources. Zhuang et al., (2017) reported that there is high correlation between the learning environment within the family at home and the school or workplace. The parents' support helps the students in completing their tasks using mobile phones, computers, internet, as well as interactions with the surrounding community. In addition, parents are not allowed to determine the outcomes based on their thoughts, but only act as companions and helping the children to complete the tasks based on the individual's abilities.

The parents are asked to provide a checklist on the completed tasks. The teachers evaluate the students' tasks at the end, giving feedback on the outcomes. The method used in this research, which involved activities between teachers and students in formal and informal learning, especially in schools with limited technology or computers, was not found in previous seamless designs. It is expected that

this design will facilitate students' independence in learning, thereby improving their metacognitive abilities through various learning experiences.

Conclusions

The development of this seamless learning component seeks to facilitate formal and informal learning, especially in schools with limited use of mobile phones or technology. This research produced instructional design and learning planning matrices, which show the activities of teachers and students in both formal and informal contexts. Based on the recommendations of some experts, the continual implementation of this informal-formal seamless learning design has the capacity to build the independence and awareness of students in learning. The importance of guidebooks for teachers and parents when implementing this instructional design was also mentioned by the experts. Based on this, students are able to build learning experience and independence and achieve in accordance with their respective abilities.

References

- Amhag, L. (2017). Mobile-Assisted Seamless Learning Activities in Higher Distance Education. *International Journal of Higher Education*, 6(3), 70. <https://doi.org/10.5430/ijhe.v6n3p70>
- Anderson, L. W., Krathwohl, D. R., Airasian, E. W., Cmikshank, K. A., Mayer, R. E., Pintrich, P. R., Raths, J., & Wittrock, M. C. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. Longman.
- Auguste, B., Kihn, P., & Miller, M. (2010). Closing the talent gap: Attracting and retaining top-third graduates to careers in teaching. *McKinsey & Company*, 46 p. <https://doi.org/http://mckinseysociety.com/closing-the-talent-gap/>
- Bian, H. (2004). Integrating environmental education into the elementary school curriculum. *Chinese Education and Society*, 37(4), 48–52. <https://doi.org/10.1080/10611932.2004.11031658>
- Dilger, B., Gommers, L., & Rapp, C. (2019). *The Learning Problems Behind the Seams in Seamless Learning*. 9162. <https://doi.org/10.1007/978-981-13-3071-1>
- Ersoy, A., & Sever, I. (2019). Investigation of Decision-Making Skills of Fourth Grade Students According to Student and Teacher Opinions. *International Electronic Journal of Elementary Education*, 12(2), 167–182. <https://doi.org/10.26822/iejee.2019257664>
- Mosvold, R., & Bjuland, R. (2011). An Activity Theory View on Learning Studies. *International Journal of Early Childhood*, 43(3), 261–275. <https://doi.org/10.1007/s13158-011-0048-4>

- Seow, P., Zhang, B., So, H., Looi, C., & Chen, W. (2008). *Towards a framework for seamless learning*. May 2014.
- Song, Y. (2018). Improving primary students' collaborative problem solving competency in project-based science learning with productive failure instructional design in a seamless learning environment. *Educational Technology Research and Development*, 66(4), 979–1008. <https://doi.org/10.1007/s11423-018-9600-3>
- Song, Y., & Kong, S. C. (2014). Going beyond textbooks: a study on seamless science inquiry in an upper primary class. *Educational Media International*, 51(3), 226–236. <https://doi.org/10.1080/09523987.2014.968450>
- Sun, D., & Looi, C. K. (2019). *An Inspiration from Border Crossing: Principle of Boundary Activity for Integrating Learning in the Formal and Informal Spaces*. Springer Singapore. <https://doi.org/10.1007/978-981-13-3071-1>
- Sureda-Negre, J., Oliver-Trobat, M., Catalan-Fernández, A., & Comas-Forgas, R. (2014). Environmental education for sustainability in the curriculum of primary teacher training in Spain. *International Research in Geographical and Environmental Education*, 23(4), 281–293. <https://doi.org/10.1080/10382046.2014.946322>
- van den Akker, J. (2013). Curricular Development Research as a Specimen of Educational Design Research. In T. Plomp & N. Nieveen (Eds.), *Educational Design Research: An Introduction* (pp. 52–71). SLO, Enschede.
- Wong, L.H. (2013). Analysis of Students' After-School Mobile-Assisted Artifact Creation Processes in a Seamless Language Learning Environment. *Journal of Educational Technology & Society*, 16, 198–211. <https://doi.org/10.2307/jeductechsoci.16.2.198>
- Wong, L.H., & Looi, C.K. (2011). What seams do we remove in mobile-assisted seamless learning? A critical review of the literature. *Computers and Education*, 57(4), 2364–2381. <https://doi.org/10.1016/j.compedu.2011.06.007>
- Zhang, B.H., & Looi, C. (2011). *Developing a sustainable education innovation for seamless learning*. 15, 2148–2154. <https://doi.org/10.1016/j.sbspro.2011.04.069>
- Zhuang, R., Fang, H., Zhang, Y., Lu, A., & Huang, R. (2017). Smart learning environments for a smart city: from the perspective of lifelong and lifewide learning. *Smart Learning Environments*, 4(1), 6. <https://doi.org/10.1186/s40561-017-0044-8>

The Teaching Efficacy of Preservice Mathematics Teachers: Research in the Republic of Serbia

DOI: 10.15804/tner.2020.61.3.05

Abstract

This research aims to study the psychometric properties and theoretical structure of the Serbian version of the Mathematics Teaching Efficacy Beliefs Instrument (MTEBI) which was developed by Enochs, Smith and Huinker (2000). The sample consisted of 252 preservice primary and preschool teachers from teacher education faculties in Serbia. The original MTEBI indicated acceptable reliability ($\alpha=0.779$). The results of confirmatory factor analysis indicate that the fit of the original MTEBI model to the data is not acceptable, but the re-specified model (MTEBI12) shows good fit and acceptable reliability ($\alpha=0.742$). These findings indicate that a short 12 item version of MTEBI possesses adequate psychometric properties and is applicable to the sample of respondents in the Republic of Serbia.

Key words: *Teaching efficacy, mathematics teaching, preservice primary and preschool teachers, MTEBI.*

Introduction

Since education is one of the most powerful initiators of progress in a society, there is a need to equip students with essential 21st century skills in order to meet social and economic challenges. 21st century skills like critical questioning and problem solving constitute part of mathematical competences, and they have

been recognized as increasingly important. Consequently, special attention needs to be paid to the education of future teachers and to the development of their competences to teach mathematics. One of the challenges teacher educators face is the fact that teachers' own schooling experiences shape their beliefs about teaching and how they interact with students, and so future-teachers' beliefs are hard to change through teacher education programs (Borko & Putnam, 1996). Consequently, it is not enough to prepare future teachers of mathematics in the areas of content, pedagogy and subject-specific pedagogy, but they also have to acquire new beliefs in these domains (Borko & Putnam, 1996; Enochs, Smith & Huinker, 2000).

Theoretical background

Teachers' beliefs directly affect the quality of their teaching (Maasepp & Bobis, 2014) and classroom practices, from curriculum implementation to changes in pedagogy (Takunyaci & Takunyaci, 2014). Several studies investigating teacher efficacy beliefs indicate that individual differences in teacher effectiveness may be related to these beliefs (Enochs, Smith & Huinker, 2000). Teacher efficacy belief is defined as the extent to which the teachers believe they can have a positive effect on students' performance (Gavora & Wiegerová, 2017; Tschannen-Moran & Hoy, 2001). It consists of two dimensions: personal (or self-efficacy) and outcome expectancy. Personal teaching efficacy is defined as a belief in individual's own ability to teach effectively, while teaching outcome expectancy is the belief that effective teaching will affect students' learning positively, regardless of external factors (Enochs, Smith, & Huinker, 2000). Although these two dimensions are interrelated, they are conceptually distinct (Bandura, 1986; Cetinkaya & Erbas, 2011).

Research studies on teacher efficacy indicate that it influences teachers' behaviours such as persistence on a task, risk taking, and use of innovations, and that it contributes to more student-centered teaching strategies, the effort invested in teaching and the goals teachers set (Enochs, Smith, & Huinker, 2000; Gavora & Wiegerová, 2017; Tschannen-Moran & Hoy, 2001). Teachers with a higher sense of efficacy exhibit greater enthusiasm for and commitment to teaching (Martins, Costa & Onofre, 2015; Tschannen-Moran & Hoy, 2001), and they are flexible in their teaching approaches, and open to new ideas and skills (Cetinkaya & Erbas, 2011). They persist when things do not go smoothly; they effectively plan and organize instruction and use innovations to meet the needs of their students

(Mostofo, 2013). Teacher efficacy is also related to student outcomes such as achievement and motivation (Tschannen-Moran & Hoy, 2001), but it is also a reliable predictor of student achievement (Bandura, 1995). Bandura's theory of self-efficacy suggests that efficacy may be most easily influenced early in the learning (Bandura, 1995; Mostofo, 2013). Some of the most powerful influences on teacher efficacy may therefore be experiences in the early years of teaching, such as those during preservice teaching practice classes and field placements (Mihajlović, 2019).

The majority of studies in teacher efficacy have focused on general teaching efficacy beliefs, not on subject-specific teaching efficacy beliefs. However, it has been reported that most of the studies in teaching efficacy showed that general teaching efficacy beliefs may not be associated with subject-specific teaching efficacy (Enochs & Riggs, 1990; Enoch, Smith & Huinker, 2000). Yet Bandura pointed out that teachers' sense of instructional efficacy does not have to be uniform across different subjects. He indicated that "teachers who judge themselves highly efficacious in mathematics or science instruction may be much less assured of their efficacy in language instruction and vice versa" (Bandura, 1997, p. 243). This, as Bandura (1997) further emphasises, means that teacher efficacy scales should be linked to different knowledge domains. The specificity is very important when studying the teaching beliefs and behaviour of elementary teachers "since elementary teachers teach all subjects and may not be equally effective in teaching all of them" (Enochs & Riggs, 1990, p. 695).

Although measurement of teacher efficacy has a long history (McGee & Wang, 2014; Tschannen-Moran & Hoy, 2001), most of the existing instruments have been designed to measure general and not domain-specific teacher efficacy. However, as previously indicated, it is important to take into account differences in the context that teachers experience, since teachers can hold differential self-efficacy beliefs across subject areas, experience, course load, and area of expertise (Wilhelm & Berebitsky, 2019). When it comes to measuring mathematics teaching efficacy, some researchers have developed more domain-specific measures of teacher efficacy (Enochs, Smith & Huinker, 2000; McGee & Wang, 2014; Wilhelm & Berebitsky, 2019).

A widely used measure of mathematics teaching efficacy beliefs is the Mathematics Teaching Efficacy Beliefs Instrument (MTEBI). The instrument was developed by Enoch, Smith, and Huinker (2000) and its purpose is to assess preservice primary teachers' efficacy in teaching mathematics. It measures teachers' beliefs toward their abilities to teach mathematics for student understanding. The MTEBI was derived from the Science Teaching Efficacy Beliefs Instrument (STEBI), which

was developed by Riggs and Enochs (1990). The MTEBI has been selected for this study because it focuses specifically on mathematics teaching efficacy, and it was used with preservice teachers in previous research.

There are a few studies that examine the use of a translated instrument in different cultural settings (Korea, Turkey, Australia, South Africa, Taiwan, Jordan). Since only a few researchers have reported that the MTEBI has an acceptable reliability and construct validity, more studies are needed to assess validity and reliability of MTEBI in different populations (Cetinkaya & Erbas, 2011; McGee & Wang, 2014).

MTEBI is comprised of two subscales: Personal Mathematics Teaching Efficacy (PMTE) and Mathematics Teaching Outcome Expectancy (MTOE) scale (Figure 1). The scores on the MTEBI scale range from 21 to 105. Reliability analysis has reported an alpha coefficient of 0.88 for PMTE and 0.77 for MTOE (Enochs, Smith & Huinker, 2000). Confirmatory factor analysis shows that the PMTE and MTOE are independent, which is in line with Bandura’s theory (Bandura, 1986).

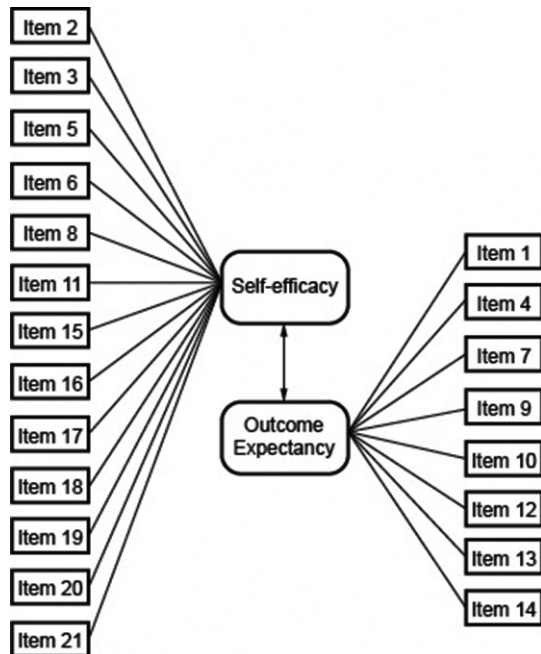


Figure 1. Factor structure of the MTEBI items (Enochs, Smith, & Huinker, 2000)

Methodology of Research

The main aim of this research was to study the psychometric properties and the theoretical structure of MTEBI (Enochs, Smith & Huinker, 2000) used in Serbia for the first time. Since there is an absence of validated instruments to measure this construct in Serbia, this research contributes to the existing body of knowledge related to measuring the mathematics teaching efficacy of preservice preschool and primary teachers. It is expected that there are two plausible and interpretable teacher efficacy factors which express preservice teachers' mathematics teaching efficacy beliefs according to the MTEBI and research results.

Research Sample

The participants of the study were 252 preservice preschool and primary teachers drawn from three faculties of education in Serbia (located in Jagodina, Užice, and Sombor). All student teachers were at the beginning of their final year of undergraduate study (Year 4). They all attended a theoretical course in Methodology of Teaching Mathematics the previous year (Year 3). The syllabi of the courses titled Methodology of Teaching Mathematics at all three faculties of education are almost identical, making these institutions compatible for research. Apart from that, the courses Practicum in Methodology of Teaching Mathematics at these institutions are placed in the final year of study, so the sample student teachers had had no previous experience in preparing and teaching lessons in Mathematics. The average age of the participants was 23.34 (SD=1.11). There were 231 (91.67%) female and 21 (8.33%) male students. There were 112 (44.4%) student teachers involved in the preschool teaching program, and 140 (55.6%) student teachers involved in the primary teaching program. There were 113 (44.8%) students from the Faculty of Education in Jagodina, 75 (29.8%) students from the Faculty of Education in Užice, and 64 (25.4%) students from the Faculty of Education in Sombor.

Instrument

As previously indicated, the MTEBI for preservice teachers is a 21 item self-report scale developed to measure preservice teachers' mathematics teaching efficacy beliefs and their outcome expectancy (Table 1). The instrument was translated from English into Serbian by a professional translator. The aim of the translation was to maintain the original denotation and connotation of items, not literal or syntactic equivalence.

Table 1. MTEBI items (Enochs, Smith, & Huinker, 2000)

Item codes	Content
E1	When a student does better than usual in mathematics, it is often because the teacher exerted a little extra effort.
E2	I will continually find better ways to teach mathematics.
E3	Even if I try very hard, I will not teach mathematics as well as I will most of the subjects.
E4	When the mathematics grades of students improve, it is often due to their teacher having found a more effective teaching approach.
E5	I know how to teach mathematics concepts effectively.
E6	I will not be very effective in monitoring mathematics activities.
E7	If students are underachieving in mathematics, it is most likely due to ineffective mathematics teaching.
E8	I will generally teach mathematics ineffectively.
E9	The inadequacy of a student's mathematics background can be overcome by good teaching.
E10	When a low-achieving child progresses in mathematics, it is usually due to extra attention paid by the teacher.
E11	I understand mathematics concepts well enough to be effective in teaching elementary mathematics.
E12	The teacher is generally responsible for the achievement of students in mathematics.
E13	Students' achievement in mathematics is directly related to their teacher's effectiveness in mathematics teaching.
E14	If parents comment that their child is showing more interest in mathematics at school, it is probably due to the performance of the child's teacher.
E15	I will find it difficult to use manipulatives to explain to students why mathematics works.
E16	I will typically be able to answer students' questions.
E17	I wonder if I will have the necessary skills to teach mathematics.
E18	Given a choice, I will not invite the principal to evaluate my mathematics teaching.
E19	When a student has difficulty understanding a mathematics concept, I will usually be at a loss as to how to help the student understand it better.
E20	When teaching mathematics, I will usually welcome student questions.
E21	I do not know what to do to turn students on to mathematics.

Data Analysis

Statistical analysis was conducted using SPSS 17.0, and for confirmatory factor analysis AMOS 7 was used. The reliability and internal consistency (item-total item correlation) for MTEBI and subscales PMTE and MTOE were assessed using

Cronbach's alpha coefficient. The multivariate normality of the MTEBI was tested by calculating Mardia's coefficient. To evaluate and confirm the factorial structures that had been found in the previous studies (Enochs, Smith & Huinker, 2000), confirmatory factor analysis was performed with the use of AMOS. The Comparative Fit Index (CFI), the Goodness-of-Fit Index (GFI), the Adjusted Goodness-of-Fit Index (AGFI), the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMR), and the Bollen–Stine bootstrap p (BS p) were used to evaluate the fit of the models using the following criteria: $GFI > .90$, $AGFI > .90$, $CFI > .95$, $RMSEA < .06$ (Kline, 2011), $SRMR < 0.08$ (Hu & Bentler, 1999), $BS\ p > 0.05$ (Bollen & Stine, 1992). The correlation between the original MTEBI and the modified MTEBI were calculated with the use of Pearson's correlation coefficient.

Results and Discussion

All data were examined for missing values. Since there were none, all responses were analysed. Descriptive statistics of the variables were determined by the use of SPSS (Table 2 and Table 3). The skewness and kurtosis indicated an acceptable degree of normality, since the data may be assumed to be normal if the skewness and kurtosis are within the accepted level of 3 and 10 respectively (Brown, 2006; Kline, 2011).

Table 2 and Table 3 summarize the reliability analysis results of the MTEBI for preservice teachers based on the two-factor model that was suggested in the previous studies (Enochs, Smith & Huinker, 2000; Enoch & Riggs, 1990). The Cronbach alpha of $\alpha = 0.779$ indicates good and acceptable reliability for the MTEBI in general. The computed Cronbach alpha for both the PMTE and MTOE subscales also express good and acceptable reliability. Item 20 has low item-total correlation, but since deletion of this item would not increase significantly Cronbach alpha, we decided to keep it for further analysis.

Table 2. Descriptive statistics and item-total correlations for PMTE items, $\alpha = 0.778$

Item code	Mean	Standard Deviation	Skewness	Kurtosis	Item-total correlations
E2	4.48	0.69	-1.18	0.96	0.37
E3*	3.70	1.13	-0.49	-0.76	0.50
E5	3.32	0.81	-0.05	0.04	0.43

Item code	Mean	Standard Deviation	Skewness	Kurtosis	Item-total correlations
E6*	3.77	0.98	-0.39	-0.63	0.47
E8*	4.37	0.75	-0.88	-0.07	0.57
E11	3.73	0.84	-0.43	0.32	0.41
E15*	3.66	1.03	-0.38	-0.53	0.39
E16	3.85	0.84	-0.27	-0.57	0.49
E17*	2.84	1.18	0.18	-0.74	0.40
E18*	3.21	1.20	-0.22	-0.68	0.27
E19*	3.86	1.11	-0.75	-0.36	0.41
E20	4.04	0.93	-1.05	1.20	0.13
E21*	4.06	0.99	-0.92	0.27	0.55
PMTE_total	48.86	6.61	-0.08	-0.68	

Items marked with * were negatively worded and were recoded

Table 3. Descriptive statistics and item-total correlations for MTOE items, $\alpha=0.780$

Item code	Mean	Standard Deviation	Skewness	Kurtosis	Item-total correlations
E1	3.66	1.01	-.252	-0.72	0.43
E4	3.86	0.82	-.298	-0.24	0.56
E7	3.22	1.02	.018	-0.47	0.53
E9	3.87	0.94	-.801	0.66	0.34
E10	3.90	0.93	-.855	0.90	0.40
E12	3.59	0.89	-.059	-0.24	0.56
E13	3.80	0.82	-.266	0.00	0.63
E14	3.47	0.89	-.002	-0.08	0.47
MTOE_total	29.37	4.60	0.15	0.31	

The average MTEBI score was 78.23 (SD=8.58), while average scores on the Personal Mathematics Teaching Efficacy (PMTE) and Mathematics Teaching Outcome Expectancy (MTOE) scales were 48.86 (SD=6.61) and 29.37 (SD=4.60), respectively. Kurtosis and skewness scores for both sub-scales and the total MTEBI all fell within -2 and 2 (Byrne, 2010). However, assessment of multivariate normality revealed that the Mardia kurtosis coefficient is 56.362 with a critical ratio of 14.394, which indicates that the data were multivariate non-normal and this could result in standard error biases (Bentler & Wu, 2005; Mardia, 1970). Therefore, the

analysis used the Maximum Likelihood (ML) estimation with bootstrapping (2000 resamples) as suggested by Nevitt and Hancock (2001). The Bollen–Stine bootstrap p assessed fit in addition to indices of χ^2 , ratio of χ^2 and its degree of freedom (χ^2/df), CFI, GFI, AGFI and RMSEA (Bollen & Stine, 1992). The Bollen–Stine estimates fit without limitations of normal theory, where $p > 0.05$ suggests excellent global fit.

Confirmatory factor analysis (CFA) was conducted to examine the construct validity of the two-factor model of the MTEBI scale (Model 1). Model 1 indicated a poor level of fit to the given data in terms of χ^2 , χ^2/df , CFI, GFI, AGFI, RMSEA and SRMR (Table 4). The Bollen–Stine p also suggested poor fit ($p = 0.000$). The items E1, E2, E9, E10, E15, E17, E18, E19 and E20 were excluded from the model and deleted due to the low values of factor loadings (lower than 0.5). Confirmatory analysis for the 12 item model (Model 2) (Table 4) obtained unsatisfactory results in terms of χ^2 , CFI and RMSEA indices, although χ^2/df , SRMR, GFI and AGFI indices fell within the acceptable range (Kline, 2011). The Bollen–Stine p (BS p) also indicated poor fit of the model. Modification indices suggested that correlating error variances of some items would increase model fit. Based on the modification indices and taking into account theoretical relevance, the links between item 5 and items 8, 11 and 16 were allowed (Figure 2). Since all those items were on the PMTE scale, correlated errors among them were not an uncommon occurrence (Enochs, Smith, & Huinker, 2000). We believe that the error variances between some of the items were probably caused by similarities in their content. For example, items 5, 11 and 16 are directly connected with teachers' beliefs about their own mathematical knowledge. Similar results were obtained by Enoch, Smith and Huinker (2000) regarding items 5 and 11. There is a similarity in items 5 and 8 when translated into Serbian (item 8 in Serbian has a similar content as the reversed item 5), so we believe that this semantic likeness might be the reason for error covariances between these items. Cetinkaya and Erbas (2011) also reported that after translating the instrument into their native language, some items had content overlap due to the specifics of the language.

After modifications, the re-specified model was tested (Model 3). Allowing errors to co-vary significantly improved model fit. The values of χ^2/df , CFI, TLI, GFI, AGFI, RMSEA and SRMR suggested that Model 3 has an acceptable fit to the data. Although the chi-square statistics χ^2 of Model 3 remained significant ($p = 0.017$), it was lower than that of the non-modified model, but the Bollen–Stine bootstrap ($p > 0.05$) suggested that the model should be accepted (Table 4). The chi-square and its p -value are the basic measures of the goodness-of-fit, but they alone should not be used as measures of goodness-of-fit, as the existence of mul-

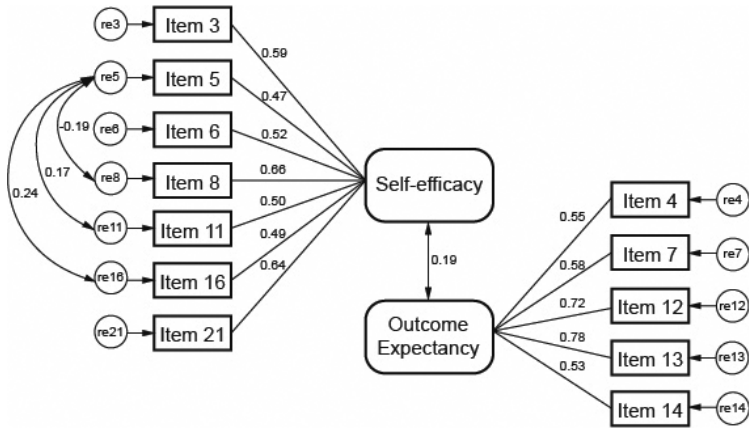


Figure 2. Two factor model MTEBI12 with correlated errors

tivariate non-normal data might produce invalid estimates. Therefore, the p-value of Bollen–Stine is used to assess the goodness-of-fit of the model. As indicated by the Bollen–Stine p-value, which is greater than 0.05 (0.126), the proposed model fits the data well.

Table 4. Summary of test statistics for CFA for Model 1, Model 2 and Model 3

	χ^2/p	χ^2/df	BS p	RM-SEA	SRMR	GFI	AGFI	CFI
Model 1	407.670/0.000	2.168	0.000	0.680	0.085	0.860	0.828	0.804
Model 2	104.947/0.000	1.980	0.008	0.062	0.062	0.933	0.901	0.920
Model 3*	73.483/0.017	1.470	0.126	0.043	0.057	0.955	0.930	0.964

GFI=Goodness-of-Fit Index; AGFI=Adjusted Goodness-of-Fit Index; CFI=Comparative Fit Index; RMSEA=Root Mean Square Error of Approximation; SRMS=Standardized Root Mean Square Residual; BS p Bollen–Stine p.Criterion: *Criteria: GFI>.90, AGFI>.90, CFI>.95, RMSEA<.06 (Kline 2011), SRMR<0.08 (Hu and Bentler 1999), $\chi^2/df<2.00$ (Tabachnik and Fidell 2007), BS p>0.05 (Bollen and Stine 1992).

Factor correlation between PMTE-7 and MTOE-5 was statistically significant, but low($r=0.193$), which suggested that latent factors represent distinct constructs (Brown, 2006). This is in line with previous research, that the two scales (PMTE

and MTOE) are independent (Enochs, Smith, & Huinker, 2000). The item total correlations of all items with the rest of the items was in the range from 0.43 to 0.53 for the PMTE-7, and from 0.46 to 0.64 for the MTOE. The Cronbach alpha for the MTEBI-12 is 0.742, while for the PMTE-7 it is 0.756 and for the MTOE-5 it is 0.765. Correlation with the original 21 item version of the MTEBI is $r=0.93$.

Conclusions

The main purpose of this study was to contribute to international research on evaluating the psychometric properties of the MTEBI. Confirmatory factor analysis suggested that the original two-factor model showed poor fit, but the re-specified 12-item model (with correlated errors) had acceptable levels of fit to the model. The MTEBI12 also showed good and acceptable reliability and internal consistency, both for the scale in general, and for the subscales. The results of confirmatory factor analysis and reliability analysis point out that MTEBI12 possesses adequate psychometric properties and construct validity, and that it is applicable to the sample of respondents in Serbia. The value of this study can be recognized in the fact that this is the first time that an instrument for assessing mathematics teaching efficacy beliefs was used in Serbia. Nevertheless, some further research work on examining validity and reliability of the MTEBI in Serbian educational settings is needed. The research on mathematics teaching efficacy beliefs has significance for educators involved in teacher education programmes who are constantly working on preparing future teachers to be able to teach mathematics effectively.

Acknowledgements

The authors would like to thank DeAnn Huinker for permission to use the research instrument MTEBI in their research.

References

- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bandura, A. (1995). Exercise of personal and collective efficacy in changing societies. In A. Bandura (Ed.), *Self-efficacy in changing societies* (pp. 1–45). New York: Cambridge University Press.

- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.
- Bentler, P.M., & Wu, E.J.C. (2005). *EQS 6.1 for Windows user's Guide*. Encino, CA: Multi-variate Software.
- Bollen, K.A., & Stine, R.A. (1992). Bootstrapping goodness-of-fit measures in structural equation models. *Sociological Methods and Research*, 21(2), 205–229.
- Borko, H., & Putnam, R.T. (1996). Learning to teach. In D.C. Berliner and R.C. Calfee (Eds.), *Handbook of educational psychology* (pp. 673–708). New York: Macmillan.
- Brown, T.A. (2006). *Confirmatory factor analysis for applied research*. New York: Guilford Press.
- Byrne, B.M. (2010). *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming*. New York, NY: Routledge.
- Cetinkaya, B., & Erbas, A.K. (2011). Psychometric properties of the Turkish adaptation of the Mathematics Teacher Efficacy Belief Instrument for in-service teachers. *The Spanish Journal of Psychology*, 14(2), 956–966.
- Enochs, L.G., & Riggs, I.M. (1990). Further Development of an Elementary Science Teaching Efficacy Belief Instrument: A Preservice Elementary Scale. *School Science and Mathematics*, 90(8), 694–706.
- Enochs, L.G., Smith, P.L., & Huinker, D. (2000). Establishing factorial validity of the mathematics teaching efficacy instrument. *School Science and Mathematics*, 100(4), 194–202.
- Gavora, P. & Wiegerová, A. (2017). Self-efficacy of students in a pre-school education programme: the construction of a research instrument. *The New Educational Review*, 47(1), 125–138.
- Hu, L., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1–55.
- Kline, R.B. (2011). *Methodology in the Social Sciences. Principles and practice of structural equation modeling (3rd ed.)*. New York, NY: Guilford Press.
- Mardia, K.V. (1970). Measures of multivariate skewness and kurtosis with applications. *Biometrika*, 57(3), 519–530.
- Martins, M., Costa, J., & Onofre, M. (2015). Practicum experiences as sources of pre-service teachers' self-efficacy. *European Journal of Teacher Education*, 38(2), 263–279.
- Maasepp, B., & Bobis, J. (2014). Prospective primary teachers' beliefs about mathematics. *Mathematics Teacher Education and Development*, 16(2), 89–107.
- McGee, J.R., & Wang, C. (2014). Validity-supporting evidence of the self-efficacy for teaching mathematics instrument. *Journal of Psychoeducational Assessment*, 32(5), 390–403.
- Mihajlović, A. (2019). Increasing Pre-service Kindergarten Teachers' Mathematics Teaching Efficacy through Lesson Study. *The New Educational Review*, 55(1), 89–99.
- Mostofo, J. (2013). *Using lesson study with preservice secondary mathematics teachers: Effects on instruction, planning, and efficacy to teach mathematics* (Doctoral dissertation). Arizona State University, USA. Retrieved from <https://repository.asu.edu/items/16460>
- Nevitt, J., & Hancock, G.R. (2001). Performance of bootstrapping approaches to model test statistics and parameter standard error estimation in structural equation modeling. *Structural Equation Modeling*, 8(3), 353–377.

- Tabachnick, B.G., & Fidell, L.S. (2007). *Using Multivariate Statistics (5th ed.)*. New York: Allyn and Bacon.
- Takunyaci, M., & Takunyaci, M. (2014). Preschool teachers' mathematics teaching efficacy belief. *Procedia – Social and Behavioral Sciences*, 152, 673–678.
- Tschannen-Moran, M., & Hoy, A.W. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education*, 17(7), 783–805.
- Wilhelm, A.G., & Berebitsky, D. (2019). Validation of the mathematics teachers' sense of efficacy scale. *Investigations in Mathematics Learning*, 11(1), 29–43.

Perfection of Learning Environments Among High, Average and Low Academic Achieving Students

DOI: 10.15804/tner.2020.61.3.06

Abstract

Academic achievement varies according to the perception of learning environments (LE). The current study aimed to investigate how the perception of LE differs according to level of academic achievement. 1,106 Thai undergraduate students replied to a survey. Analyzing the data with One-way analysis of variance differences were found in perception of the LE in terms of task orientation and instructor feedback. Average-achieving students perceived task orientation higher than high and low-achieving students. High-achieving students perceived instructor feedback the most. This study provides insights into each type of LE applied in the classroom and suggests how individual academic achievers can be suitably enhanced.

Key words: *academic achieving students, autonomy support, cooperation, investigation, learning environment, task orientation.*

Introduction

A classroom learning environment (CLE) significantly influences student learning outcomes. Recently, many researchers have been focused on this topic both in Western countries and Asia. Yang (2015) examined junior high school students in China and found that where the CLE includes investigation, teacher support can foster students' achievement in Mathematics. Rita and Martin-Dunlop's (2011)

finding also demonstrated that the CLEs (i.e., teacher support, investigation) were linked with US students' academic achievement. CLEs also boost motivation, course satisfaction (Ji et al., 2017; Radovan & Makovec, 2015), attitudes and self-esteem (Chionh & Fraser, 2009). A CLE refers to generating interaction between instructors and students, and amongst students in a particular classroom. It can also be referred to in other terms: the condition, situation, environment and psycho-social environment of the classroom (Malik & Rizvi, 2018).

Differences in students' perception of CLEs have been found for students with different levels of academic achievement (Ahmed et al., 2018; Malik & Rizvi, 2018). Cosmovici et al. (2009), investigating middle school students, claimed that students who attained highest and lowest grade levels were likely to perceive CLEs less favourably, compared with middle-grade level students. By contrast, Ahmed et al. (2018) found that higher-achieving students had a more favourable perception of CLEs than lower-achieving students. As evidence is conflicting, the purpose of this study is to compare the perception of CLEs by students of differing levels of academic achievement. The specific research questions were as follow:

- Which aspect of the learning environments do students perceive most highly?
- Does the perception of learning environments differ for low, middle and high achieving students?

Conceptual framework

The current study concentrates on five aspects of CLEs, including task orientation, support of autonomy, cooperation, investigation, and instructor feedback. These five aspects have been recognized as important CLEs for enhancing students' learning in higher education (Lu et al., 2014).

Task orientation

A task-oriented environment has been found to be strongly associated with achievement outcomes (Chionh & Fraser, 2009). Students were found to have increased their attention span and patience with distractions in order to succeed in their academic tasks, and learn new skills (Mullola, Hintsanen, & Keltikangas-Järvinen, 2015). Task orientation also increases students' motivation and self-regulation in science learning (Velayutham & Aldridge, 2013). Students were found to understand and recognize the significance of setting goals (e.g., planned activities, amount of work done) in achieving the goals. In post-secondary

education, individual differences were found in the relationship between task orientation and academic outcomes. Task orientation affected students' grade point average (GPA) positively in the case of students who had higher intelligence, but did not affect students with lower intelligence (Oliver, Guerin, & Gottfried, 2007). Task orientation refers to the persistence in an activity to succeed, no matter what obstacles they are faced with (Oliver et al., 2007).

Autonomy support

Autonomy support in classrooms is defined as providing students with the opportunities to make choices in tasks or activities, and offering them the freedom to ask questions and share their ideas (Greene et al., 2004). Supporting autonomy is related to motivation beliefs; this environment offers students the chance to use decision-making skills, and enhances self-concept, self-regulation in terms of controlling their behavior, and responsibility (Wang & Holcombe, 2010). Students' autonomy has been found to differ according to their levels of academic achievement (Wang, 2012). Autonomy support has been found to impact students' sense of task value, expectancy, and academic self-concept in high achieving students, but not for those who are of a lower academic level (Wang, 2012). Higher achieving students needed less steering from instructors and used decision-making skills. Lower achievers were felt to need more structured guidance from instructors. Some evidence identified that autonomy did not affect students' academic achievement (Malik & Rizvi, 2018).

Cooperation

A major goal of learning in universities around the world is the ability to work in teams (Lee, Kim, & Byun, 2017). Cooperative learning has become a popular CLE and highly influences students' learning in higher education. Students who engaged in a group to achieve goals were likely to get higher test scores (Tsay & Brady, 2010). Using cooperative learning with post-secondary students can foster students' academic performance (Hsiung, 2012) and knowledge retention (Tran, 2014). Moreover, spending a large part of their learning time in a cooperative environment can improve student homework and performance on unit tests (Hsiung, 2012). Research in secondary schools demonstrated that structured cooperative learning increased the academic achievement of all types of students (i.e., low-, average-, and high-achieving students; Yaduvanshi & Singh, 2019). The students were likely to acquire knowledge, and understanding, and be able to apply it in some cognitive domains. In some evidence, however, there was little difference in the perceived value of group work between lower and higher achieving students (Healy, Doran, & McCutcheon, 2018). Students with higher academic ability were

more likely to use leadership skills in cooperative learning, compared with students with other ability levels (Healy et al., 2018).

Investigation

Investigation is defined as “skills and processes of inquiry and their use in problem-solving and investigations are emphasized,” (Velayutham & Aldridge, 2013, p. 513). Students who participated in an environment using investigation were able to control their effort and motivation in learning (Velayutham & Aldridge, 2013), and it also boosted their academic achievement (Yang, 2015). Students also retained more content knowledge from using their ideas and inquiries in solving problems (Velayutham & Aldridge, 2013). However, a study in Pakistani context found that investigation negatively affected academic achievement (Malik & Rizvi, 2018). Students did not receive good results in this environment.

Instructor feedback

Generally, instructors providing feedback are considered to be a benefit for students’ learning (Mulliner & Tucker, 2015). Feedback enables students to understand more about their misunderstandings (Lane et al., 2018) and poor skills (Gang, 2018), and to navigate their next steps of learning (Brown, Peterson, & Yao, 2016). Feedback has also been found to promote students’ GPA, academic self-efficacy, and self-regulation (Brown et al., 2016). However, perception of the quality of feedback depended on students’ level of achievement. Higher achieving students perceived teacher feedback more highly than lower-achieving students (Sichinga et al., 2014). Pitt, Bearman, and Esterhazy (2020), however, pointed out that students with lower grades may gain more benefit from feedback.

Methodology of Research

Participants

The participants included 1,106 undergraduate students in six universities in Thailand. They were selected through the method of convenience sampling. The students studied in various year levels and majors. To compare students’ academic achievement, they were divided into three groups: high-average- and low-achieving students on the basis of their GPA. High-achieving students had GPAs above 3.49 points. Average-achieving students had GPAs between 2.50 and 3.49. For the last group, low-achieving students had GPAs below 2.50. Table 1 shows descriptive statistics for gender and academic achievement.

Table 1. Descriptive statistics for gender and academic achievement levels

	High-achieving students (n)	Average-achieving students (n)	Low-achieving students (n)	Total (N)
Male	46	239	120	405
Female	145	483	73	701
Total	191	722	193	1,106

Instrument and Procedures

We adapted the survey from the What Is Happening In This Class? questionnaire (Aldridge, Fraser, & Huang, 1999) in terms of task orientation (6 items), cooperation (7 items) and investigation (7 items). Alpha reliability coefficients were 0.77, 0.87 and 0.84, respectively. The items on autonomy support were adapted from the Survey of classroom goals structures (Blackburn, 1998). Four items relate to providing independence to students to ask questions, share their opinions, and choose assignments ($\alpha = .73$). Instructor feedback was represented in three items ($\alpha = .72$), taken from Xu (2011). All of the constructs used a five-point Likert scale, with values as follows: 5 = always, 4 = often, 3 = sometimes, 2 = seldom, and 1 = never. The instrument reliability was calculated using Exploratory factor analysis and Cronbach's alpha, the results of which were acceptable. The back translate method was utilized in the study to write the items in the Thai version.

The researcher was given permission to do this research and collect data from the universities by university ethical committees. The data were gathered by face-to-face survey. Students were informed that they would be anonymous in the survey and that they could refuse to provide answers without it having any effect on their studies. The respondents replied to the questions on their own with paper and pencil. They spent fifteen to thirty minutes to complete the copies of the survey.

Data Analysis

The data were checked for missing values, outliers, normality and homogeneity of variance as a first step. One-way analysis of variance (ANOVA) was used to compare survey results with students' academic achievement. A post-Hoc Tukey test was used to compare academic achievement differences between groups.

Results of Research

Descriptive data showed that cooperative learning in the CLEs was perceived by students most highly ($\bar{X} = 4.141, SD = .557$). Autonomy support, by contrast, was perceived lowest ($\bar{X} = 3.888, SD = .590$). The perception values for all the constructs were above 3.5. Table 2 shows means and standard deviations of the constructs in the scale, divided by different levels of academic achievement groups.

Table 2. Descriptive statistics for the constructs divided by academic achievement groups

Construct	High-achieving students		Average-achieving students		Low-achieving students		Total	
	M	SD	M	SD	M	SD	M	SD
Task orientation	4.041	.482	4.082	.481	3.870	.540	4.038	.498
Autonomy support	3.856	.608	3.901	.595	3.872	.550	3.888	.590
Cooperation	4.132	.532	4.160	.557	4.081	.579	4.141	.557
Investigation	3.728	.565	3.757	.555	3.671	.520	3.737	.551
Instructor feedback	4.154	.606	4.027	.638	3.895	.643	4.026	.637

The ANOVA indicated that there was a significant difference between the groups on task orientation ($F(2, 1, 104) = 14.223, p = .000$) and instructor feedback ($F(2, 1, 103) = 8.024, p = .000$). On the other hand, no significant differences were identified for autonomy support, cooperation and investigation. Table 3 shows the relation between each aspect of the CLEs and students' academic achievement levels.

Post hoc comparison using the Tukey test revealed that high- ($p = .002$) and average- ($p = .000$) achieving students perceived task orientation more highly than low-achieving students. For instructor feedback, high-achieving students significantly differed from average- ($p = .038$) and low-achieving students ($p = .000$). There was also a significant difference between average- and low-achieving students ($p = .027$).

Table 3. Differences in learning environments based on academic achievement levels

Construct	Variance	SS	df	MS	F-ratio
Task orientation	Between Groups	6.879	2	3.439	14.223***
	Within Groups	266.972	1,104	.242	
	Total	273.851	1,106		

Construct	Variance	SS	df	MS	F-ratio
Autonomy support	Between Groups	.364	2	.182	.523
	Within Groups	383.996	1,104	.348	
	Total	384.360	1,106		
Cooperation	Between Groups	.959	2	.479	1.548
	Within Groups	341.937	1,104	.310	
	Total	342.895	1,106		
Investigation	Between Groups	1.131	2	.565	1.864
	Within Groups	334.733	1,104	.303	
	Total	335.864	1,106		
Instructor feedback	Between Groups	6.440	2	3.220	8.024***
	Within Groups	442.595	1,103	.401	
	Total	449.035	1,105		

*** .001

Discussion

Prior studies have shown inconsistent results for the perception of CLEs by high-, average-, and low-achieving students. The aim of the present study was to investigate how perceptions of CLEs differ by students of different levels of academic achievement. The CLEs included task orientation, autonomy support, cooperation, investigation, and instructor feedback. The data were collected from undergraduate students in Thailand and analyzed through ANOVA.

In response to the first research question it was found that students perceived cooperative learning most highly, compared with other aspects of learning environments. Zakaria et al. (2013) explained that students preferred cooperative learning because it offered students the opportunity to discuss and share their ideas and to ask their friends questions without anxiousness. Moreover, students also enjoyed working in groups. However, Herrmann (2013) argued that some students were frustrated with cooperative learning because instructors spent less time teaching and they had to deal with peer interaction, which led to greater misconceptions.

For the second research question, results of the ANOVA revealed a distinction in perception of CLEs according to level of academic achievement. There were differences in terms of task orientation and instructor feedback among different academic achievers. This result was not in accordance with findings in Malik &

Rizvi's (2018) study in secondary school. They found that there were no differences of perception on learning environment aspects by levels of academic achievement.

When we consider differences in perception of task-orientation, Oliver et al.'s (2007) study identified that task orientation impacted only on the GPA of students of higher intelligence while our study found that average-achieving students perceived task-orientation significantly higher than high and low-achieving students. Ji et al. (2017) suggested that task orientation led students to recognize the significance and benefits of assigned activities and that it was also involved with students' setting goals so as to succeed in specific tasks or activities (Ji et al., 2017). DiFrancesca, Nietfeld, and Cao (2016), however, claimed that the number of high- and low- achieving students who set goals for learning outcomes did not differ, which may help to explain our results. The average academic achievers may perceive the importance of assigned activities the highest because they want to have a high level of academic achievement. Cosmovici et al. (2009) identified that students who attained highest and lowest grade levels were less likely to perceive learning environments, compared with those of average-grade students.

Pertaining to the instructor feedback, high-achieving students perceived it most highly. This result is in line with a study in the secondary school (Malik & Rizvi, 2018). Their findings revealed that high achievers had higher scores for perceived teacher support than achievers of other levels. Since teacher support is a crucial factor in learning environments that support the enjoyment of education and intrinsic goal-orientation (Radovan & Makovec, 2015), an effect for instructor feedback was found in this study.

Conclusions, implications, and limitations

This study provides insights into types of CLE that are perceived to enhance particular individual academic achievement. Instructors should consider and offer a suitable environment for students. In light of these results, task orientation and instructor feedback seem to be an essential environment in the classroom. Instructors should consider motivating students to set goals to accomplish the course outcome and tasks. Specifically, instructors should clearly explain the usefulness of setting learning goals to lower-achieving students and guide them to succeed in their intentions (Ji et al., 2017). In the same way, providing feedback can help students to understand the content and mistakes more. Instructors may consider suitable types of feedback to apply to individual students and instructors should be

sure that the feedback provided is beneficial and helps students grow or improve in their learning.

Even though the study used a large sample size, there are some limitations which should be taken into account in future investigations. First, the study relied on self-reports, which is a subjective measure. Therefore, to gain a deeper knowledge, future research should include other methods of data collection such as experiments, interviews, or observations. The second limitation concerns the sample which included students of different academic majors and years as an overall view of higher education. Future studies may specify a specific academic major (e.g., Mathematics, Business Studies, Engineering) or year group. The third limitation was asking for perspectives of CLE from the students only. To understand more about these issues, the next study should ask for perspectives of both students and instructors. Lastly, other learning environments may be affected by variation in academic achievement, such as innovation in teaching, and competition among students.

Acknowledgements

Our thanks to the Petchra Pra Jom klao Ph.D. Research scholarship, King Mongkut's University of Technology Thonburi, Thailand for funding this research.

References

- Ahmed, Y., Taha, M.H., Al-Neel, S., & Gaffar, A.M. (2018). Students' perception of the learning environment and its relation to their study year and performance in Sudan. *International Journal of Medical Education*, 9, 145–150.
- Aldridge, J.M., Fraser, B.J., & Huang, T.-C.I. (1999). Investigating Classroom Environments in Taiwan and Australia with multiple research methods. *The Journal of Educational Research*, 93(1), 48–62.
- Blackburn, M. (1998). *Academic cheating*. Unpublished doctoral dissertation, University of Oklahoma.
- Brown, G.T., Peterson, E.R., & Yao, E.S. (2016). Student conceptions of feedback: Impact on self-regulation, self-efficacy, and academic achievement. *British Journal of Educational Psychology*, 86(4), 606–629.
- Chionh, Y.H., & Fraser, B.J. (2009). Classroom environment, achievement, attitudes and self-esteem in geography and mathematics in Singapore. *International Research in Geographical and Environmental Education*, 18(1), 29–44.
- Cosmovici, E.M., Idsoe, T., Bru, E., & Munthe, E. (2009). Perceptions of learning environment and on-task orientation among students reporting different achievement levels:

- A study conducted among Norwegian secondary school students. *Scandinavian Journal of Educational Research*, 53(4), 379–396.
- DiFrancesca, D., Nietfeld, J.L., & Cao, L. (2016). A comparison of high and low achieving students on self-regulated learning variables. *Learning and Individual Differences*, 45, 228–236.
- Gang, R. (2018). What makes a good learning environment. Retrieved 14/03/2020, from <https://raccoongang.com/blog/what-makes-good-learning-environment/>
- Greene, B.A., Miller, R.B., Crowson, H.M., Duke, B.L., & Akey, K.L. (2004). Predicting high school students' cognitive engagement and achievement: Contributions of classroom perceptions and motivation. *Contemporary Educational Psychology*, 29, 462–482.
- Healy, M., Doran, J., & McCutcheon, M. (2018). Cooperative learning outcomes from cumulative experiences of group work: Differences in student perceptions. *Accounting Education*, 27(3), 286–308.
- Herrmann, K.J. (2013). The impact of cooperative learning on student engagement: Results from an intervention. *Active Learning in Higher Education*, 14(3), 175–187.
- Hsiung, C.M. (2012). The effectiveness of cooperative learning. *Journal of Engineering Education*, 101(1), 119–137.
- Ji, C., Duffield, S., Wageman, J.J., & Welch, A.G. (2017). Student perceptions of the classroom learning environment and motivation to learn Chinese. *Chinese as a Second Language. The journal of the Chinese Language Teachers Association, USA*, 52(2), 111–126.
- Lane, K.L., Menzies, H.M., Ennis, R.P., Oakes, W.P., Royer, D.J., & Lane, K.S. (2018). Instructional choice: An effective, efficient, low-intensity strategy to support student success. *Beyond Behavior*, 27(3), 160–167.
- Lee, H.-J., Kim, H., & Byun, H. (2017). Are high achievers successful in collaborative learning? An explorative study of college students' learning approaches in team project-based learning. *Innovations in Education and Teaching International*, 54(5), 418–427.
- Lu, G., Hu, W., Peng, Z., & Kang, H. (2014). The influence of undergraduate students' academic involvement and learning environment on learning outcomes. *International Journal of Chinese Education*, 2(2), 265–288.
- Malik, R.H., & Rizvi, A.A. (2018). Effect of classroom learning environment on students' academic achievement in mathematics at secondary level. *Bulletin of Education and Research*, 40(2), 207–218.
- Mulliner, E., & Tucker, M. (2015). Feedback on feedback practice: Perceptions of students and academics. *Assessment & Evaluation in Higher Education*, 42(2), 266–288.
- Mullola, S., Hintsanen, M., & Keltikangas-Järvinen, L. (2015). Temperament and motivation. *International Encyclopedia of the Social & Behavioral Sciences*, 24(2), 184–190.
- Oliver, P.H., Guerin, D.W., & Gottfried, A.W. (2007). Temperamental task orientation: Relation to high school and college educational accomplishments. *Learning and Individual Differences*, 17(3), 220–230.
- Pitt, E., Bearman, M., & Esterhazy, R. (2020). The conundrum of low achievement and feedback for learning. *Assessment & Evaluation in Higher Education*, 45(2), 239–250.
- Radovan, M., & Makovec, D. (2015). Relations between students' motivation, and percep-

- tions of the learning environment. *Center for Educational Policy Studies Journal*, 5(2), 115–138.
- Rita, R.D., & Martin-Dunlop, C.S. (2011). Perceptions of the learning environment and associations with cognitive achievement among gifted biology students. *Learning Environments Research*, 14(1), 25–38.
- Sichinga, K., Mfuni, J., Nenty, H., & Chakalisa, P. (2014). Factors influencing quality of feedback in teaching in Botswana senior secondary schools. *International Journal of Research In Social Sciences*, 4(1), 26–37.
- Tran, V.D. (2014). The effects of cooperative learning on the academic achievement and knowledge retention. *International journal of higher education*, 3(2), 131–140.
- Tsay, M., & Brady, M. (2010). A case study of cooperative learning and communication pedagogy: Does working in teams make a difference? *Journal of the Scholarship of Teaching and Learning*, 10(2), 78–89.
- Velayutham, S., & Aldridge, J.M. (2013). Influence of psychosocial classroom environment on students' motivation and self-regulation in science learning: A structural equation modeling approach. *Research in Science Education*, 43(2), 507–527.
- Wang, M.-T. (2012). Educational and career interests in math: A longitudinal examination of the links between classroom environment, motivational beliefs, and interests. *Developmental psychology*, 48(6), 1643.
- Wang, M.-T., & Holcombe, R. (2010). Adolescents' perceptions of school environment, engagement, and academic achievement in average school. *American Educational Research Journal*, 47(3), 633–662.
- Xu, J. (2011). Homework completion at the secondary school level: A multilevel analysis. *The Journal of Educational Research*, 104(3), 171–182.
- Yaduvanshi, S., & Singh, S. (2019). Fostering achievement of low-, average-, and high-achievers students in Biology through structured cooperative learning (STAD method). *Education Research International*, 2019.
- Yang, X. (2015). Rural junior secondary school students' perceptions of classroom learning environments and their attitude and achievement in mathematics in West China. *Learning Environments Research*, 18(2), 249–266.
- Zakaria, E., Solfitri, T., Daud, Y., & Abidin, Z.Z. (2013). Effect of cooperative learning on secondary school students' mathematics achievement. *Creative Education*, 4(2), 98.



Taejin Koh, Sungeun Choi,
Jeong Kyung Park,
Kyungeun Park
Korea

Are Tandem Classrooms Effective in Developing Intercultural Communicative Competence?

DOI: 10.15804/tner.2020.61.3.07

Abstract

The aim of this paper is to explore the effectiveness of tandem classrooms in promoting intercultural communicative competence by comparing the competence of students before and after participation in tandem classes. This research is based on the descriptive statistics from a survey administered at a university in South Korea. The survey was conducted in 2016 during the second semester, and it used students who participated in tandem classrooms by employing a questionnaire to measure the effectiveness of the tandem classrooms in relation to intercultural communicative competence and the students' perception of their own competence after completing the tandem classes. The result of the research shows that unlike the initial expectations, there is no meaningful sign that the surveyed students have developed intercultural communicative competence, which means that tandem classrooms did not actively help students improve this competence. In this study, an in-depth interview with students was also conducted in 2019 to find out why such a result occurred. Although tandem classrooms would be highly valuable as a language learning method, the approach may require redesigning and reimplementation in great detail to become a method for developing intercultural communicative competence. Therefore, this study highlights the underlying need for a revised curriculum for students attending tandem classrooms.

Keywords: *Tandem, Intercultural Communicative Competence, International Students, Tandem Classroom, Curriculum.*

Introduction

The tandem learning method is based on a mutual language exchange between the tandem partners. The term *tandem* was initially adopted to use for language education between French and German students in 1968 (Rosanelli, 1992). It is generally agreed that the tandem network, which was launched and developed by Jürgen Wolff, Marisa Delgado, Bernhard Leute, and Gracia Martín Torres in 1983 (Calvert, 1992), has been facilitated as a programme for foreign language learning (Rosanelli, 1992; Brammerts, 2001). The two main pillars of tandem learning are the principles of autonomy and reciprocity, i.e., the ability to take charge of and to be responsible for one's own learning and the goodwill of tandem partners to exchange knowledge and to support each other in the learning process, respectively (Brammerts 2001, pp. 10–15; Tardieu & Horgues, 2020: pp. 2–3).

Tandem learning not only improves communication skills but also cultivates collaborative and self-directed learning methods. Moreover, tandem learning seems to be an optimized model for understanding mutual cultures in language education. Intercultural communication competence (ICC) is the ability to execute effective and appropriate communication behaviours that negotiate each other's cultural identity or identities in a culturally diverse environment (Chen & Starosta, 1999, p. 28). It is also suggested that effective ICC may include empathy, motivation, tolerance for uncertainty, respect, flexibility, self-knowledge, other types of knowledge and so forth (Byram, 1997; Alptekin, 2002; Kohn, 2013). Therefore, the tandem learning method can facilitate the acquisition of authentic language as well as intercultural competences since this pedagogical model is based on the mutual exchange between tandem partners who are familiar with their own cultures. However, it has not been estimated how much the tandem model can cultivate intercultural communication competence.

Literature Review and Research Focus

Most previous tandem studies have focused on e-tandem methods due to the lack of learning partners or foreign students during onsite/offline sessions (Kim & Koh 2018) and have developed or designed curricula. St. John and Cash (1995), Little and Brammerts (1996), Woodin (1997), Shetzer (1997), Appel (1999), and Little et al. (1999) discussed the principles, methods, and effects of learning in tandem by e-mail. In research related to web-based tandem learning, Appel and Mullen (2000) improved the e-mail environment and conducted error analysis on vocabulary and grammar that appeared through the web to be specially designed to explore the development direction of tandem learning. Cziko (2004) proposed

an easy way to learn a second language by developing the Electronic Network for Language and Culture Exchange (ENLACE) using communication media. Nocchetti (2012) also introduced computer-based tandem learning as a method of teaching English to adult learners in Italy. Elia (2006) examined how to study English and Italian using Skype, which provides Voice over Internet Protocol (VoIP) services. Vassallo & Telles (2006) discussed the principles and characteristics of online tandem programmes using Windows Live Messenger and discussed the possibility of introducing tele-tandem learning for all foreign language learning in Brazil.

Over the decades, although tandem learning has been researched in various fields, very limited research has been conducted in relation to Intercultural Communicative Competence (ICC). Other studies have linked the effects of tandem learning with the promotion of intercultural communication (Calvert, 1999; Schenker, 2012; Woodin, 2010). Based on an American-German telecollaboration, Schenker (2012) explored ICC within the framework of Byram's model (1997) and revealed that no significant change was found in cultural learning. Other studies, on the other hand, have demonstrated strong correlation between language learning and improving ICC in tandem learning by employing the method of conversational analysis (Woodin, 2013; Sabbah-Taylor, 2017).

The above studies have certainly examined the effectiveness of tandem learning in acquiring language skills through e-tandem programmes. However, it has not been properly shown that tandem learning will improve ICC. Hence, this study will try to assess ICC in onsite tandem classrooms. The following questions guided the study:

- (1) Can tandem classrooms improve linguistic competence as well as intercultural communication competence?
- (2) How effective are tandem classrooms in enhancing intercultural communicative competence?

Research Context and Instrument

In 2016, over the course of the second semester, a number of full-fledged tandem classrooms for paired languages, including Hindi-Korean, Japanese-Korean, Vietnamese-Korean, and Russian-Korean, were conducted at Busan University of Foreign Studies. Each onsite/offline tandem classroom consisted of 15-week-long modules with a 3-hour weekly session. The basic purpose of these tandem classrooms was to build linguistic communication skills. However, the modules

cover some specified themes, including cultural differences between the partners, to promote the understanding of each other’s culture.

The participants in the study were 87 full-time undergraduate students enrolled in the university. The students were checked by completing a simple demographic profile before the survey was conducted by the school’s Centre for Teaching and Learning.

In addition, an in-depth interview was also conducted with several students who participated in Polish-Korean and Thai-Korean tandem programs at Hankuk University of Foreign Studies in 2019.

Table 1. Participant demographics

	Categories	Student No.	Percentage (%)
Gender	Male	34	39.1 %
	Female	53	60.9 %
Grade	First Year	2	2.3 %
	Second Year	34	39.1 %
	Third Year	31	35.6 %
	Fourth Year	20	23.0 %
Total		87	100 %

Source: *Tandem Centre (Report on Tandem Effect: ACE 4–3-4).*

This study used a survey on ICC developed by the Centre for Teaching and Learning (see Appendix). This questionnaire consists of items related to empathy, respect, tolerance, self-knowledge, other types of knowledge, and motivation. Ordinal responses were provided on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

Table 2. Descriptive statistical analysis

	N	Mini- mum	Maxi- mum	M	SD	SKEW.P	KURT
Gender	87	1	2	1.61	.491	-.445	-1.844
Grade	87	1	4	2.78	.836	.089	-.934
CA1	87	2	5	4.07	.759	-.280	-.729
CA2	87	2	5	3.54	.860	.041	-.613
CA3	87	3	5	4.68	.581	-1.649	1.737
CA4	87	1	5	3.90	.977	-.631	.141

	N	Mini- mum	Maxi- mum	M	SD	SKEW.P	KURT
CA5	86	2	5	4.12	.773	-.674	.276
CA6	87	1	5	4.14	.942	-1.050	.721
CA7	87	2	5	3.94	.826	-.145	-.961
CA8	87	3	5	4.30	.701	-.491	-.851
CA9	87	2	5	4.39	.783	-1.265	1.253
CA10	87	2	5	4.15	.815	-.548	-.553
CA11	87	1	5	4.00	.792	-.718	1.257
CA12	87	1	5	4.21	.878	-1.054	1.058
CA13	87	1	5	3.75	1.070	-.466	-.544
CA14	87	1	5	4.10	.876	-.947	.968
CA15	87	1	5	3.51	1.311	-.568	-.831
CA16	86	1	5	3.78	1.202	-.934	.132
CA17	87	1	5	4.03	.970	-1.244	1.762
CA18	87	1	5	4.10	.977	-1.284	1.812

Source: *Tandem Centre (Report on Tandem Effect: ACE 4–3-4)*.

Research Results

The framework survey was administered through the classrooms to measure the effectiveness of the tandem classrooms in relation to intercultural communicative competence and to explore how the students perceived their level of competence after completing the tandem classes.

As Table 3 indicates, no significant difference was found in the post-survey regardless of the question items. The overall perceptions of the students, regardless of gender and grade, were considerably different from the initial expectation that the onsite tandem learning method increases ICC. The result is highly likely to stem from discrepancy in goals (i.e. improving language skill vs. intercultural communicative competence) rather than variation in the instructional learning method (i.e. traditional learning vs. tandem learning). In other words, according to the students who participated in the tandem class at HUFSS, they enrolled in the class to improve their language competence through teaching and learning with their partners based on the given curriculum, but not to understand each other's culture.

Table 3. Pre-post survey analysis

		M	N	SD	SE
Difference	Pre-survey	4.0391	87	.53406	.05726
	Post-survey	4.0581	87	.64854	.06953

Following the analysis of the overall perceptions, this study analysed the students’ perceptions of the ICC items, as summarized in Table 4. No statistically meaningful level of significance was found for gender (male students: correlation .132, p-value .457; female students: correlation .012, p-value .933). Unlike the initial expectation, tandem method did not greatly improve interaction. This may indicate that students experienced difficulties in discussing with their course participants and tandem partners.

Table 4. Analysis of the result

		Difference (Pre-Post)			95 % Confidence Interval		t	df	p-value
		M	SD	SE	lower	upper			
Differ- ence	Pre- Post	-.01904	.80847	.08668	-.19135	.15326	-.220	86	.827

Although the upper-grade students’ ICC levels showed little difference, their perceptions did not display a significant result when examined by t-test. This result does not attest to the existence of an interaction effect between instructional method and grade group. It is also notable that some of the upper-grade students were not able to understand each other’s culture because of their limited languages skills.

Table 5. Analysis: upper-grade students

		Difference (Pre-Post)			95 % Confidence Interval		t	df	p-value
		M	SD	SE	lower	upper			
Dif- fer- ence	Pre- Post	.01961	.80591	.11285	-.20706	.24627	.174	50	.863

Conclusion

The aim of this study was to assess intercultural communication competence in onsite tandem learning. Over the years, only a small number of studies have examined the impact of tandem classrooms on intercultural communicative competence. Based on the current study of 87 students implemented in full-fledged tandem classrooms, the results indicate that participating in tandem classrooms does not significantly cultivate the intercultural communication competence of the students. There is no doubt that tandem learning increases one's language capacity. However, the hypothesis that tandem communication will also improve one's intercultural communication competence has not been proven in this study. Additional interviews with students who also participated in the tandem program at Hankuk University of Foreign Studies were conducted to find out why the hypothesis was not valid. The reason for this outcome is that tandem classrooms are primarily designed to strengthen students' language communication competence, not to foster their intercultural communication skills. It should be noted that intercultural communication competence may vary depending on the level of language proficiency of students, and there could be a limitation of the students' verbal expressions regarding understanding the other culture. In other words, the existing curriculum may not be adequate for cultivating two competences simultaneously. Therefore, the cultivation of intercultural communication competence in the tandem programme can only be achieved by the development of an appropriate curriculum and pedagogy that considers the linguistic level of the participants. The results of this study, with no significant statistical data for the development of ICC, thus demonstrate the necessity of the improvement of future tandem programmes.

Research limitations

It may be difficult to assess intercultural communicative competence. No suitable instruments have yet been developed to measure this competence. In this paper, a self-developed tool was employed, although this tool still leaves many aspects to be desired. Moreover, cultural differences or national characteristics were not used to examine intercultural communicative competence in this research.

Acknowledgements

This work was supported by Hankuk University of Foreign Studies Research Fund of 2020. It is also noted that this paper was based on the unpublished Tandem Report (ACE 4-3-4) conducted by Tandem Centre.

References

- Alptekin, C. (2002). Towards intercultural communicative competence in ELT. *ELT Journal* 56(1), 57–64.
- Appel, C. (1999). Tandem language learning by e-mail: some basic principles and a case study. *CLCS Occasional Paper No. 54*, Dublin: Trinity College.
- Appel, M.C. & Mullen T. (2000). Pedagogical considerations for a web-based tandem language learning environment. *Computers & Education* 34, 291–308.
- Brammerts, H. (2001). Autonomes Sprachenlernen im Tandem: Entwicklung eines Konzepts (Autonomous Language Learning in Tandem: Development of a concept). In *Selbstgesteuertes Sprachenlernen im Tandem: Ein Handbuch (Self-controlled Language Learning in Tandem: A Manual)*, H. Brammerts, and K. Kleppin (eds.), 9–16. Tübingen: StauffenburgBrammerts.
- Byram, M. (1997). *Teaching and Assessing Intercultural Communicative Competence*. Bristol: Multilingual Matters.
- Tandem Centre (2017). Report on Tandem Effect (ACE 4-3-4). Unpublished Report. Busan University of Foreign Studies.
- Calvert, M. (1992). Working in tandem: peddling an old idea. *Language Learning Journal*, 6, 17–19.
- Calvert, M. (1999). Tandem: A vehicle for language and intercultural learning. *The Language Learning Journal*, 19(1), 56–60. doi:10.1080/09571739985200111
- Chen, G. M. & Starosta, W. J. (1999). A review of the concept of intercultural awareness. *Human Communication*, 2, 27–54.
- Cziko, G.A. (2004). Electronic tandem language learning (eTandem): A third approach to second language learning for the 21st century. *CALICO Journal* 22(1), 25–39.
- Elia, A., (2006). Language learning in tandem via skype, *The Reading Matrix*, 6, 269–280.
- Kim, D. & Koh, T. (2018). Tandem translation classroom: a case study. *Journal of Multilingual and Multicultural Development*, 39, 97–110.
- Kohn, K. (2013, March). Intercultural communicative competence: an English as a lingua franca perspective. Paper presented at TESOL Arabia, Dubai, UAE.
- Little, D., & Brammerts, H. (1996). A guide to language learning in tandem via the Internet. *CLCS Occasional Paper*, No. 46, Dublin: Trinity College.
- Little, D., et al. (1999). Evaluating tandem language learning by e-mail. Report on a bilateral project. *CLCS Occasional Paper*, No. 55, Dublin: Trinity College.
- Nocchetti, S. (2012). Learning L2 English in Tandem Partnerships On-Line. *Sino-US English Teaching*, 9(7), 1318–1324.

- Rosanelli, M. (1992). *Language in Tandem: Autonomy and Language Acquisition*. Merano: Alpha and Beta Verlag.
- Sabbah-Taylor, A. (2017). Interactional and intercultural competence in tandem learning: A micro-analytic perspective, Unpublished Ph.D. thesis, Newcastle University.
- Saeideh, A. & Zamanian, J. (2014). Intercultural Communicative Competence in Foreign Language Classroom. *International Journal of Academic Research in Business and Social Sciences*, 4(11), 9–16.
- Schenker, T. (2012). Intercultural Competence and Cultural Learning through Telecollaboration. *CALICO Journal*, 29(3), 449–470.
- Woodin, J. (2013). Native of Intercultural Speakers? An Examination of Dyadic Conversations between Spanish- and English- Speaking Tandem Learners. In *Language and intercultural communication in the new era*, Sharifian, F., & Jamarani, M. (eds.). New York: Routledge.
- Shetzer, H.S. (1997). Critical reflection on the use of e-mail in teaching English as a second language, Unpublished Master thesis, University of Illinois.
- St John, E., & Cash, D. (1995). German language learning via e-mail: a case study. *ReCALL*, 7(2), 47–51.
- Tardieu, C., & Horgues, C. (eds.). (2020). *Redefining Tandem Language and Culture Learning in Higher Education*. New York: Routledge.
- Woodin, J. (1997). E-mail tandem learning and the communicative curriculum. *ReCALL*, 9(1), 22–33.
- Woodin, J. (2010). Cultural categorisation: what can we learn from practice? An example from tandem learning, *Language and Inter-cultural Communication*, 10(3), 225–242.
- Vasallo, M.L., & Telles, J.A. (2006). Foreign language learning in Tandem. Theoretical Principles and Research Perspectives. *The ESPECIALIST* 25(1), 1–37.

Appendix.

Intercultural Communicative Competence Instrument (Survey)

The following statements and questions are related to how you perceive your global cultural competency through the tandem classroom.

Please indicate your agreement or disagreement with each statement based on the following Likert scale:

⑤ = strongly agree ④ = somewhat agree ③ = neutral ② = somewhat disagree ① = strongly disagree

CA1. I am interested in the history and culture of other countries.

CA2. I am aware of the differences or similarities of other religious or cultural practices.

- CA3. I think we should not discriminate against another person due to their different nationality or gender.
- CA4. I think multiculturalism enriches our lives and society.
- CA5. I think ethics and morality can be changed according to the specificity of the age, country, and historical situation.
- CA6. I like to eat foreign food.
- CA7. I fully accommodate the lifestyles of other countries, although they are not familiar to me.
- CA8. I like to be exposed to various cultures and languages.
- CA9. I want to be friendly with foreign students, and it would be good to work together as a team.
- CA10. Even if I go to other countries, I am confident that I will do well.
- CA11. I have my own norms, but I flexibly act according to the circumstances rather than stick to my norms.
- CA12. I will not miss the opportunity to challenge myself no matter how hard it is.
- CA13. I am not greatly stressed even if my living environment changes.
- CA14. I consider the global stage as an opportunity rather than a threat so that I challenge myself positively.
- CA15. I have participated in various cultural exchange programmes and events.
- CA16. I have travelled/studied abroad.
- CA17. I contact my foreign friends via SNS or e-mail.
- CA18. I have taken a course related to foreign culture.

Problem Solving in Mathematics and Scientific Reasoning

DOI: 10.15804/tner.2020.61.3.08

Abstract

The paper describes the results of a study whose aim was to explore correlations among the components of the construct Culture of problem solving (mathematical intelligence, reading comprehension, creativity and ability to use existing knowledge) and six dimensions of Scientific reasoning, which was tested by the Lawson's Classroom Test. The total of 180 pupils from the Czech Republic aged 14–15 took part in this study. The results show that the dimensions proportional reasoning, control of variables and probability reasoning strongly correlate with the components mathematical intelligence, reading comprehension and ability to use existing knowledge.

Key words: *Culture of problem solving, Scientific reasoning, mathematics education, lower secondary school.*

1. Introduction

Problem solving, especially in mathematics, is still of significant interest in mathematics teaching and learning (Md Hassan & Rahman, 2017; Doulik, Eisenmann, Příbyl, & Škoda, 2016). This paper focuses on two constructs that are related to problem solving. The first construct is the modified *Culture of problem solving* (CPS), which was introduced by the authors of this paper as a tool for describing a pupil's preconditions for solving mathematical problems (Eisenmann, Novotná, Příbyl, & Břehovský, 2015). The other construct is *Scientific reasoning* (SR), which

includes the thinking and reasoning skills that are involved in systematic exploration of a problem, formulating and testing hypotheses, evaluating experimental outcomes, etc. (Bao et al., 2009).

Science constitutes an important part of education in the area of STEM (*Science, Technology, Engineering and Math*) and it helps to develop SR efficiently. A number of researchers (e.g. Shayer & Adey, 1993; Bao et al., 2009) show that development of *science process skills* enables pupils to solve problems better (and this is well described by the structure of CPS for the area of mathematical problems) and to understand knowledge from the area of STEM. For example, Shayer and Adey (1993) show in their research that development of science process skills has a permanent impact on the general ability to learn. Similar conclusions in the research stimulated us to explore correlations between SR and CPS constructs.

Cihlář, Eisenmann, Hejnová, and Příbyl (2018) presented the results of a preliminary study conducted among 23 pupils aged 14–15 in the Czech Republic in 2016. More extensive research, the aim of which was to describe the mutual correlations between all components of the modified CPS (see section 2.1) and the SR dimensions, was conducted in 2017. The parameters of this new research allow us to accept its conclusions about these relations at standard level of significance. The paper presents results of this research.

2. Theoretical background

2.1 The Culture of problem solving

The composition of CPS is described in detail in Eisenmann et al. (2015). Let us stress that the CPS describes the conditions for success of an individual problem solver and is independent of the problem itself, and also of the solver's knowledge and their attitude to problem solving.

When originally developing the structure of the CPS, we primarily used the works of Schoenfeld, (1982); Sriraman, (2005); and Wu and Adams, (2006). "The problem-solving profile" (Wu & Adams, 2006) is understood as a tool for measuring a pupil's ability to solve problems. This tool focuses on two components that are also included in our CPS construct, namely: reading comprehension/ extracting information from the wording of a problem and mathematical concepts, mathematisation of the problem and reasoning.

Originally, this form of CPS consisted of four components: intelligence, reading comprehension, creativity and ability to use the existing knowledge. The original component 'intelligence' has been replaced by a new component – *mathematical*

intelligence (INTEL) in this study. This indicator was developed on the basis of works by Juter and Sriraman, (2011) and Gardner, (1993). Neither of the two tools was adopted as a whole. In both cases, only selected parts were adapted for our context (test administration, age of the respondents).

Reading comprehension (READ) is one of the competences that plays an important role in solving mathematical problems. Underdeveloped reading literacy is a significant obstacle, especially in the case of word problems (Vilenius-Tuohimaa, Aunola, & Nurmi, 2008; Fuentes, 1998; Pape, 2004).

In our original research, we work with creativity in the sense of divergent thinking (Guilford, 1967) and its relation to problem solving (Kwon, Park, & Park, 2006). By divergent thinking we mean the production of diverse but suitable answers to an open question or problem. We refer to this component as *creativity* (CREAT). Chamberlin and Moon (2005, p. 38) are convinced that higher creativity is prerequisite to the solution of non-routine problems in mathematics.

The *ability to use existing knowledge* (KNOW) is the fourth component of the CPS. This component has been developed by the team of authors with the aim of operationalizing the degree of formalism. This ability has been considered as prerequisite to successful solving of non-routine problems. Whilst solving such kinds of problems, knowledge itself is not sufficient; the solver must also be able to use it.

2.2 Scientific reasoning

Scientific reasoning can be characterised as a set of general skills that include specific thinking and logical processes, referred to as science process skills (Padilla, 1990). The American Association for the Advancement of Science (1989) formulated thirteen of these skills, which are divided into *basic science process skills* (observation, measurement, classification, quantification, inferring, predicting, identifying variables, communication) and *integrated science process skills* (interpreting data, controlling variables, operational definitions, hypothesizing, experimenting). This set of widely transferable skills reflects how scientists work, therefore it can help pupils to conduct scientific inquiry successfully. The individual dimensions of SR are not independent but create a certain hierarchy.

When conceptualizing Scientific reasoning, we, similarly to Lawson (1978), assumed that his structure stemmed from the hypothetical-deductive nature of science. That is why we base our research on an operational definition that enables us to assess scientific reasoning in six dimensions: conservation of matter and volume (CONSER), proportional reasoning (PROPOR), identification and control of variables (VARIABLE), probability reasoning (PROBAB), correlational reasoning (CORREL) and hypothetical-deductive reasoning (HYPDED).

2.3 Correlations between CPS and SR

There is a whole range of aspects that play a role in the development of pupils' creativity, one of which is inquiry-based education (Kadir, Lucyana, & Satriwati, 2017). Inquiry-based education develops not only creativity, but also supports elimination of formalist thinking. Kotsari and Smyrnaioi (2017) state that this type of education eliminates formalism not only in the teaching of mathematics but also in the teaching of physics. Papáček (2010) states that creativity and a low level of formal knowledge are related to the level of pupils' science process skills. Since CPS includes the components CREAT and KNOW in its structure, we assume there must be correlations between the components of CPS and dimensions of SR.

3. Research questions and hypotheses

RQ: How do the individual components of the Culture of problem solving (CPS) correlate with scientific reasoning (SR)?

The first hypothesis arises from our preliminary research (Cihlář et al., 2018):

H1: The component KNOW from the CPS construct forms three pairs of dependent quantities

with dimensions of proportional reasoning, control of variables and probability reasoning of the SR construct.

The second hypothesis works with the component INTEL, which was not studied in the preliminary research:

H2: The component INTEL forms pairs of dependent quantities with all measured dimensions of the SR construct.

4. Methodology

The following subsections focus on the way of measuring both the constructs and the description of the research sample. One of the requirements of this study was that the research should be conducted using collective testing.

4.1 Culture of problem solving

All four CPS components were tested within a single 45-minute lesson. The parts of the test focusing on INTEL lasted 13 minutes, READ 13 minutes, CREAT 9 minutes and KNOW 9 minutes. All tested pupils were working independently,

they were allowed to use only simple calculators. All parts of the test were evaluated by the authors of this paper.

The test of INTEL consisted of 8 problems. The problems could be divided according to the areas of study: logical reasoning (1 and 2); conception of infinity (3 and 6); spatial imagination – mental transformation (4); algebraic thinking (5); arithmetic patterns (7); geometric imagination in plane (8). All the test problems with the exception of problem 3 were closed multiple-choice tasks with one correct answer. The conceptual construct of the test was based on the following two principles: the first principle was the perspective of administering a test in a restricted time limit. If there were too many open questions, the testing would take long. This is connected to the other principle which was that the test should contain both open questions – represented by the subtest CREAT, and closed questions. What we tried to study in INTEL was not the pupils' creativity in the particular variables but the level of their sensitiveness to the above mentioned phenomena in individual areas. The test taker could get 2 points for each problem and the total sum indicates the index of INTEL. Problems 1 and 6 consisted of two questions, for each of which the test taker could get one point.

As far as READ is concerned, the pupils were set a short text of 15 lines. Afterwards, their task was to answer 4 closed and 2 open questions. The aggregate of all points formed the total score. The test was created on the same principle as used in the PISA research.

The level of CREAT was measured by Guilford's Alternative Uses Test. The pupils proposed as many 'uses of common objects' as possible. Qualitative evaluation of each test part was translated into points and the total score indicated an index of creativity. For example: The word "key" was presented to the pupils in the test. It was stressed out that what was meant was the key used for locking and unlocking. Alternatives that would get points were e.g.: hair decoration or gun in self-defence. Alternatives that were not rated: "treble clef" (mistaking object and word – the Czech word for treble clef includes the word key) or "to open the door" (this is not an alternative use).

The pupils' KNOW was assessed on the basis of a set of four problems. At the beginning of each problem, some item of previously learned knowledge was revised. This was followed by a simple application problem whose solution required active use of the particular item of knowledge.

4.2 Scientific reasoning

SR was tested by the *Lawson's Classroom Test of Scientific reasoning* (Lawson, 1978). We used the Czech version of the current version of Lawson's test released

in the year 2000 (for shortened version see Dvořáková (2011); the full version was published as a part of dissertation of the author) and we carried out small corrections in items 8a and 8b according to Han, (2013).

The Lawson's test is a 24-item, two-tier test which involves a series of multiple-choice questions. Each of the two-tier items consists of a question with some possible answers followed by a second question giving possible reasons for the response to the first question.

The Lawson's test assesses pupils' reasoning abilities in the six dimensions mentioned above, including conservation of matter and volume (CONSER) (items 1 to 4), proportional reasoning (PROPOR) (items 5 to 8), control of variables (VARIABLE) (items 9 to 14), probability reasoning (PROBAB) (items 15 to 18), correlation reasoning (CORREL) (items 19, 20) and hypothetical-deductive reasoning (HYPDED) (items 21 to 24). The items are of increasing difficulty.

When evaluating the test, a pupil would get two points for questions 1 to 22 if they chose *both* the correct answer to the question *and* the correct justification of the answer. The answers to the questions 23 and 24 were evaluated independently, that is the pupil got one point for each question answered correctly, or one point for selecting its correct justification. The pupils solved the test within a single 45-minute lesson.

4.3 Research sample

A total of 180 pupils (76 girls and 104 boys) aged 14–15 from one fourth grade of an eight-year secondary grammar school and from eight ninth grade classes from six lower secondary schools took part in our study. All schools were located in the Ústí nad Labem Region. In the research sample above average, average, and below average pupils were included.

4.4 Statistical evaluation

To assess the dependence or independence of individual quantities, Pearson's χ^2 -test for contingency tables and Spearman's correlation coefficient were used. From multidimensional methods, cluster analysis and canonical correlation analysis were selected. The level of significance was used in all tests.

4.5 Preliminary research

The test of the component INTEL (the only test that was not validated sufficiently before our research) was developed at the beginning of 2017 in four rounds of pilot testing, always with about 40 pupils at the age of 14 to 15. Item analysis led

to gradual selection of problems that were then used in the research study which is described here.

5. Results and discussion

24 pairs of quantities were studied, where the first quantity was one of the four components of CPS and the other quantity was one of the six dimensions of SR. Pearson’s χ^2 -test of dependence was conducted for all pairs of quantities of independence. Furthermore, Spearman’s coefficient of rank correlation was examined and using cluster analysis the Euclidean distance between the corresponding standardized quantities was measured.

The seven strongest correlations between components of CPS and dimensions of SR are given in Table 1.

Table 1. Strongest correlations between components of CPS and dimensions of SR

Pairs of variables	χ^2 -test			Spearman R	Distance
	χ^2	df	p-level		
READ & VARIABL	42.4741	9	0.000003	0.42134	12.9
INTEL & PROBAB	37.4531	6	0.000001	0.48732	12.4
KNOW & PROPOR	36.3491	8	0.000015	0.42078	13.6
INTEL & PROPOR	35.1819	6	0.000004	0.40103	13.0
KNOW & PROBAB	31.4128	8	0.000119	0.37935	13.9
KNOW & VARIABL	28.4091	12	0.004818	0.35383	14.4
READ & PROPOR	27.4276	6	0.000120	0.37116	13.9

It follows from the results in Table 1 that hypothesis H1 was confirmed.

When verifying the validity of hypothesis H2 it was found that the component INTEL makes pairs of dependent quantities with all the dimensions of SR, with the exception of HYPDED. The results from testing with the dimensions PROBAB and PROPOR are presented in Table 1, for the dimensions CONSER, VARIABL, and CORREL respectively the corresponding p-values are 0.002532, 0.022990, and 0.000451. However, the hypothesis on independence could not be rejected for the dimension HYPDED (). This means hypothesis H2 was not verified in its word-for-word form.

Canonical correlation analysis showed that the correlation coefficient of linear combinations of components of CPS and dimensions of SR with coefficients in

Table 2 was $R = 0.676$ ($F = 4.958, f = 24, p = 0.000$) and that this accounted for 49.3% of the variance. In further steps no other significant linear combinations were discovered.

Table 2. Coefficients of linear combinations with maximum correlation coefficient

CPS				SR					
READ	INTEL	KNOW	CREAT	CONSER	PROPOR	VARIA- BL	PROBAB	CORREL	HYPD- ED
0.426	0.491	0.313	0.103	0.226	0.259	0.208	0.300	0.349	0.021

The strongest dependences are shown in Figure 1.

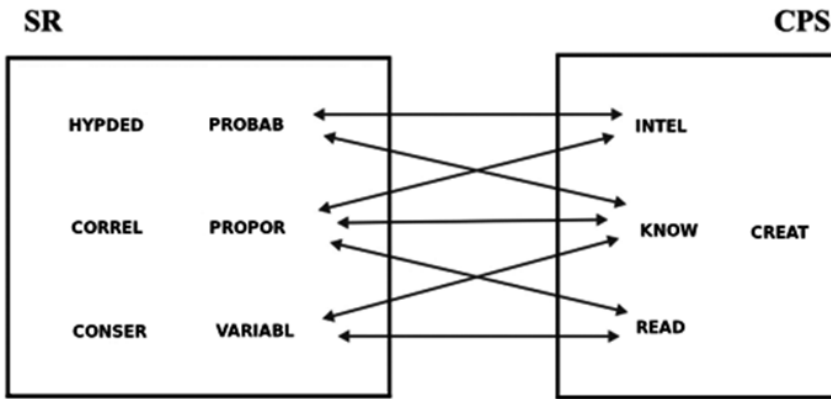


Figure 1. Strongest dependences between components of CPS and dimensions of SR

As stated above, the component KNOW of the CPS correlates strongly with three dimensions of the SR (PROPOR, VARIABL and PROBAB) (see hypothesis H1). In the following section we first interpret the dependences discovered.

PROPOR is a basic skill that children usually develop at a fairly young age. In learning, proportional reasoning is recognized as a fundamental reasoning construct necessary for mathematics and science achievement (Roth & Milkent, 1991). Since the component KNOW from the CPS was assessed on the basis of a set of the problems for some of which the skill of proportional reasoning was prerequisite, the dependence discovered between KNOW and PROPOR is one of the strongest.

The dimension VARIABL predominantly covers the skill to identify variables and the relations among them. It is a component of scientific inquiry, which is understood to mean skills in discovering or constructing knowledge for oneself (Dean & Kuhn, 2007). Similarly KNOW is prerequisite to successful solving of non-routine problems. That is why it is legitimate to expect the dependence between KNOW and VARIABL which was found in the research.

The problems in the Lawson's test targeting PROBAB are based on classical interpretation, that is the probability of an event is defined as the ratio of the number of outcomes favourable to the event, divided by the total number of possible outcomes. A precondition of correct solution of these problems is, among others, a good level of PROPOR. Taking into account what has been already stated above about the relation between KNOW and PROPOR, the stronger dependence between PROBAB and KNOW discovered is not surprising.

Similarly, the stronger dependence between the component READ of the CPS and the dimensions PROPOR and VARIABL of the SR comes as no surprise. A good level of skills needed to get information from a text is essential for successfully solving the problems in the Lawson's test that were used to diagnose the level of the dimensions PROPOR and VARIABL.

INTEL, in our interpretation, does not focus on testing specific knowledge and skills in mathematics but on a 'kind' of sense for mathematics. A strong dependence between INTEL and PROPOR and INTEL and PROBAB is not surprising. Both of these dimensions work to a certain degree with ratio and the sense of proportionality is developed in children first when learning and practicing operations in basic arithmetic. There is a weaker dependence between INTEL and CONSER, VABIABL and CORREL. These three dimensions of SR correspond to a certain degree with having a sense for mathematics. In mathematics lessons pupils learn about area and volume being maintained when geometrical objects are manipulated, which is the abstract foundation of the dimension CONSER. In algebraization of a solving process pupils get familiar with the basic ideas of variables, which are the background of VARIABL. At the age of 14–15 pupils have already been introduced to the functional approach to mathematics, which corresponds to the dimension CORREL.

It can also be stated that no correlation between INTEL and HYPDED was found. A possible reason for this may be that pupils may not be guided or encouraged to use combinatorial reasoning, and this is one of the possible topics for future research.

To conclude this section, let us briefly refer to the limits of this research study. Undoubtedly the scope of our research sample which consisted of pupils

exclusively from one region was a limitation. However, we are convinced that this limitation has no major impact on the results presented here.

6. Conclusions

In our contribution we focused on the correlation between two constructs (CPS and SR) that explore the basic skills prerequisite for solving different types of problems. The discovered correlations and dependences were analysed in detail. The possible reasons for the correlations between these constructs were shown. We should emphasize that the individual dimensions of SR are not independent but create a hierarchy, which means that successful solution of tasks from a higher dimension supposes the mastering of tasks from the lower dimensions. The findings from this research show that three of the dimensions (PROPOR, VARIABL and PROBAB) correlate more significantly with KNOW, READ and INTEL. Thus we are convinced that the mastering of KNOW and READ by pupils at the end of lower secondary school is tightly linked with the development of more general skills. This is very important for school practice in particular, since it is clear that development of learners in the STEM area (e.g. in mathematics) is a good precondition for development of more general skills that are also applicable in other areas of education.

Acknowledgement

This work was supported by TACR, project no. TL02000200.

References

- American Association for the Advancement of Science. (1989). *Project 2061: Science for all Americans*. Washington, DC: AAAS.
- Bao, L., Cai, T., Koenig, K., Fang, K., Han, J., Wang, J., Wu, N. (2009). Learning and Scientific Reasoning. *Science*, 323, 586–587. DOI: 10.1126/science.1167740
- Cihlář, J., Eisenmann, P., Hejnová, E., & Příbyl, J. (2018). Relations between Scientific Reasoning and Culture of Problem Solving. *Journal on Efficiency and Responsibility in Education and Science*, 11, 38–44. DOI: 10.7160/eriesj.2018.110203
- Chamberlin, S.A., & Moon, S.M. (2005). Model-eliciting activities as a tool to develop and identify creatively gifted mathematicians. *Journal of Secondary Gifted Education*, 17, 37–47. DOI: 10.4219/jsge-2005–393

- Dean, D. Jr., & Kuhn, D. (2007). Direct instruction vs. discovery: the long view. *Science Education*, 91, 384–397. DOI: 10.1002/sce.20194
- Doulík, P., Eisenmann, P., Příbyl, J., & Škoda, J. (2016). Unconventional Ways of Solving Problems in Mathematics Classes. *The New Educational Review*, 43, 53–66. DOI: 10.15804/tner.2016.43.1.04
- Dvořáková, I. (2011). Vědecké myšlení žáků – Jak ho lze rozvíjet a testovat [Scientific reasoning ability – How to develop and test it]. In M. Randa (Ed.), *Moderní trendy v přípravě učitelů 5* [New trends in teachers' education 5]. Plzeň: University of West Bohemia. [CD-ROM]. Available from https://kdf.mff.cuni.cz/lide/dvorakova/Plzen_prispevek_Dvorakova.pdf
- Eisenmann, P., Novotná, J., Příbyl, J., & Břehovský, J. (2015). The development of a culture of problem solving with secondary students through heuristic strategies. *Mathematics Education Research Journal*, 27, 535–562. DOI: 10.1007/s13394–015–0150–2
- Fuentes, P. (1998). Reading Comprehension in Mathematics. *The Clearing House*, 72, 81–88. DOI: 10.1080/00098659809599602
- Gardner, H.E. (1993). *Frames Of Mind: The Theory Of Multiple Intelligences*. New York (NY): Basic Books.
- Guilford, J.P. (1967). *The nature of human intelligence*. New York (NY): McGraw-Hill.
- Han, J. (2013). Scientific Reasoning: Research, Development, and Assessment, [Unpublished Thesis]. Ohio: The Ohio State University.
- Juter, K., & Sriraman, B. (2011). Does High Achieving in Mathematics = Gifted and/or Creative in Mathematics? In B. Sriraman & K.H. Lee (Eds.), *The Elements of Creativity and Giftedness in Mathematics*. (pp. 45–65). Rotterdam, Netherlands: Sense Publishers.
- Kadir, L., & Satriawati, G. (2017). The Implementation of Open-Inquiry Approach to Improve Students' Learning Activities, Responses, and Mathematical Creative Thinking Skills. *Journal on Mathematics Education*, 8, 103–114. DOI: 10.22342/jme.8.1.3406.103-114
- Kotsari, C., & Smyrniou, Z. (2017). Inquiry based learning and meaning generation through modelling on geometrical optics in a constructionist environment. *European Journal of Science and Mathematics Education*, 5, 14–27.
- Kwon, O.N., Park, J.S., & Park, J.H. (2006). Cultivating divergent thinking in mathematics through an open-ended approach. *Asia Pacific Education Review*, 7, 51–61.
- Lawson, A.E. (1978). The development and validation of a classroom test of formal reasoning. *Journal of Research in Science Teaching*, 15, 11–24. DOI: 10.1002/tea.3660150103
- Md Hassan, N., & Rahman, S. (2017). Problem Solving Skills, Metacognitive Awareness, and Mathematics Achievement: A Mediation Model. *The New Educational Review*, 49, 201–212. DOI: 10.15804/tner.2017.49.3.16
- Padilla, M. (1990). The science process skills. *Research Matters – to the Science Teacher*, No. 9004. Available from <http://www.narst.org/publications/research/skill.cfm>
- Papáček, M. (2010). Badatelsky orientované přírodovědné vyučování – cesta pro biologické vzdělávání generací Y, Z a alfa? [Inquiry based science education: A way for the biol-

- ogy education of generations Y, Z, and alpha?] *Scientia in Educatione*, 1, 33–49. DOI: 10.14712/18047106.4
- Pape, S.J. (2004). Middle school children's problem-solving behavior: A cognitive analysis from a reading comprehension perspective. *Journal for Research in Mathematics Education*, 35, 187–219. DOI: 10.2307/30034912
- Roth, W.M., & Milkent, M.M. (1991). Factors in the Development of Proportional Reasoning Strategies by Concrete Operational College Students. *Journal of Research in Science Teaching*, 28, 553–566. DOI: 10.1002/tea.3660280608
- Schoenfeld, A.H. (1982). Measures of problem-solving performance and of problem-solving instruction. *Journal for Research in Mathematics Education*, 13, 31–49. DOI: 10.2307/748435
- Shayer, M., & Adey, P.S. (1993). Accelerating the development of formal thinking in middle and high school students IV: three years after a two-year intervention. *Journal of Research in Science Teaching*, 30, 351–366. DOI: 10.1002/tea.3660300404
- Sriraman, B. (2005). Are Giftedness and creativity synonyms in mathematics? *The Journal of Secondary Gifted Education*, XVII, 20–36. DOI: 10.4219/jsge-2005-389
- Vilenius-Tuohimaa, P.M., Aunola, K., & Nurmi, J.-E. (2008). The association between mathematical word problems and reading comprehension. *Educational Psychology*, 28(4), 409–426. DOI: 10.1080/01443410701708228
- Wu, M., & Adams, R. (2006). Modelling mathematics problem solving item responses using a multidimensional IRT model. *Mathematics Education Research Journal*, 18, 93–113. DOI: 10.1007/BF03217438

The Effect of Hybrid Task-Based Language Teaching and Critical Thinking on Writing Performance in Indonesia

DOI: 10.15804/tner.2020.61.3.09

Abstract

This study aims to describe the effect of hybrid task-based language teaching and critical thinking skills on writing performance among Indonesian learners. This study employed experimental research with a factorial design. The participants were Indonesian undergraduate learners majoring in an English program. The instruments used were critical thinking questionnaires and writing tests in the genre-based writing course. The results of the study showed that hybrid-task-based language teaching was effective for improving EFL learners' writing performance. Also, it revealed that learners with high critical thinking achieved better writing performance than learners with low critical thinking after being taught by hybrid task-based language teaching. The results indicate that hybrid task-based language teaching and critical thinking have a significant effect on EFL writing performance.

Keywords: *hybrid learning, task-based language teaching, critical thinking, writing performance*

Introduction

Writing is a productive skill in language learning. Writing has an important role in academic success for college students (Silva, 2014). Consequently, several studies concerning strategies for teaching writing in tertiary education were con-

ducted by researchers (Anderson, Anson, Gonyea & Paine, 2015; Lumpkin, 2018). Teaching writing in tertiary education needs to train students to work together, to analyze their errors, and to revise their writing themselves. Furthermore, college teachers may make use of various strategies involving learners in assessment and using new technology to assess their learners' writing products (Escorcía, 2015; McNaught & Benson, 2015).

Despite its importance, many problems arise when learners are assigned to write English texts. These obstacles to writing are related to affective, linguistic, and cognitive factors (Al Mubarak, 2017, Ashraf & Bilal, 2016; Zabihi, 2017). These writing problems are also faced by Indonesian college learners (Ismail, Hussin & Darus, 2012; Rahmatunisa, 2014). Learners suffer from lack of ideas, the inability to be critical in writing, and are poor at grammar and vocabulary.

To counteract poor writing performance among Indonesian learners, an innovative teaching strategy is needed to maximize their language output in the process of teaching writing. Recently, the rapid use of information and communication technology in educational settings has triggered many language teachers to use internet technology for language learning (Aghajani & Adloo, 2018). As regards learners' performance of tasks, language teachers can integrate task-based language teaching (TBLT) and technology in writing activities in a hybrid learning environment (Baralt & Gomez, 2017). Hybrid learning integrates online learning and face-to-face learning (Garrison & Kanuka, 2004) which represents a real opportunity to create learning experiences by providing appropriate learning in schools and colleges (Hassana, 2014). Therefore, hybrid TBLT is recognized as a solution to the weaknesses perceived in both traditional learning and online learning when giving writing tasks to learners.

Student writers need to think critically in order to be able to write texts in English (Abbasi & Izadpanah, 2018) and Indonesian college learners have problems with critical thinking ability (Nasution, 2019). Critical thinking is viewed as cognitive skills or abilities and dispositions or attitude towards those skills (Facione, 2015). The effect of critical thinking on language proficiency has been investigated by many researchers (Ramezani, Larsari, & Kiasi, 2016; Wang & Seepho, 2016). Critical thinking has a strong relationship with language learning achievement. Specifically, the influence of critical thinking toward writing proficiency has been investigated by researchers (Golpour, 2014; Mehta & Al-Mahrooqi, 2014) who showed that critical thinking skills and writing proficiency are positively correlated.

Several researchers (Adams & Nik, 2014; Oskoz & Elola, 2014) have conducted studies on the effect of task-based language teaching assisted with technology on

writing performance. Previous studies (Park, 2012; Travakoli, Lotfi, Biria & Wang, 2019) reveal that the use of technology-mediated TBLT with consideration of cognitive factors is under-explored in EFL writing contexts. Furthermore, most hybrid learning studies (Lai & Li, 2011; Chong & Reinders, 2018) are conducted in ESL classrooms, and accounts of integrating TBLT with technology in Indonesia (an EFL context) are still rare (Purnawarman, Susilawati & Sundayana, 2016; Tyas, Muam, Sari & Dewantara, 2020). It is, therefore, significant to explore the application of hybrid TBLT in the EFL writing context of Indonesian college learners.

Problem of Research

The present study aims to describe the effect of hybrid TBLT and critical thinking on EFL writing performance. In this research, the hypotheses are as follows:

First, there will be a significant difference in writing performance between EFL learners taking classes through hybrid TBLT and EFL learners taking classes through traditional language teaching.

Second, there will be a significant difference in writing performance between EFL learners who have high critical thinking and EFL learners who have low critical thinking skills.

Methodology of Research

Research Sample

This study was experimental research with a 2x2 factorial design. This research was conducted in a private college in Central Java Province, Indonesia. Ninety undergraduate learners majoring in the English program were selected for the research sample through a purposive sampling technique. They were taking a genre-based writing course in the fall semester. The learners (two intake classes) were assigned into two groups, namely the experimental group taught by hybrid TBLT and the control group taught by traditional language teaching. The learners were also grouped into those with high and low critical thinking skills. The research variables, thus, were independent variables (hybrid TBLT and traditional language teaching strategies), a dependent variable (writing performance), and moderator variables (high critical thinking and low critical thinking).

Instruments and Procedures

Critical thinking questionnaires and writing tests were employed as research instruments. The Critical thinking questionnaire was adapted from Facione's (2015) Critical Thinking Disposition Self-Rating Form (CTDSRF). The writing-embedded critical thinking self-rating form used a five-point (1–5) Likert scale, namely *always* (1), *often* (2), *sometimes* (3), *seldom* (4), and *never* (5). The 20-item critical thinking questionnaire measured learners' critical thinking, which consisted of truth-seeking, open-mindedness, analyticity, systematicity, confidence, inquisitiveness, and cognitive maturity in their writing process. Meanwhile, writing tests were used to reveal students' writing proficiency before and after getting interventions of hybrid TBLT strategy. Students' expository texts in the pre-test and post-test were then scored based on Brown and Abeywickrama's (2010) five-criteria scoring: organization, logical development of ideas (content), grammar, punctuation, spelling, and mechanics, and style and quality of expression (vocabulary).

The data were collected in sixteen meetings for one semester. In the first meeting, both groups were assigned critical thinking questionnaires to answer for fifteen minutes. After that, the learners were assigned an expository text to write for sixty minutes with the topic: "Single-sex education". In the experimental group, the learners then practiced writing in small groups with a Google Classroom tool in a hybrid learning environment. Learning activities contained three teaching phases in both face-to-face and online learning situations. In the pre-task, the teacher provided the learners with prior activities before the tasks were performed such as introducing interesting topics, essential vocabulary and grammatical structures. Afterwards, learners were asked to compose a text in online learning assisted by Google Classroom on the given writing prompts in the during-task phase. Groups of learners wrote drafts, and their peers responded by giving online feedback. In the post-task phase, the learners rewrote the expository text for face-to-face task discussion.

In the control group, EFL learners experienced the writing activities through traditional language teaching in the classroom setting. Learning activities comprised writing task cycles: presentation, practice, and production in face-to-face learning. In the presentation phase, the teacher explained the grammar and vocabulary needed by introducing samples of writing. In the practice phase, the learners worked together to accomplish the tasks. Teacher finally revised and discussed learners' writing products in a whole classroom discussion. In the last meeting, the writing prompt with the topic: "Death penalty for drug dealers" was given to both groups.

Data Analysis

For data analysis, learners' critical thinking skills were initially grouped into high and low levels based on the results of the questionnaires. Descriptive analysis was conducted to measure the means and standard deviation of the writing scores. Also, inferential analysis was conducted on the post-test scores of the experimental and control groups for learners with high and low critical thinking skills by employing a two-way analysis of variance (ANOVA) test. The parametric statistics analysis program, SPSS 22, was employed.

Research Results

All the data obtained from the critical thinking (CT) questionnaires and writing tests were analyzed by statistical tests assisted by the SPSS 22 program. The test results can be seen in the following tables.

Table 1. Post-test results comparing hybrid TBLT and traditional language teaching groups

Groups	Mean	SD	F	Sig.
Hybrid TBLT	78.39	10.31	4.79	.031
Traditional language teaching	72.29	15.63		

Table 1 reveals that the mean scores of hybrid TBLT and traditional language teaching groups were 78.39 and 72.29. It shows that there was a significant difference in the post-test writing results between hybrid TBLT and traditional language teaching since the F-value was higher than the F-table ($4.79 > 2.76$) and the significance value (0.031) was lower than 0.05.

Table 2. Post-test results comparing high critical thinking and low critical thinking student groups in the hybrid TBLT group

Groups	Mean	SD	F	Sig.
High CT	79.72	10.77	4.01	.045
Low CT	74.93	14.42		

Table 2 reveals that the mean scores of high critical thinking and low critical thinking groups were 79.72 and 74.93. It shows that there was a significant difference in the post-test writing results between the high critical thinking and low

critical thinking groups since the F-value was higher than the F-table ($4.01 > 2.76$) and significance value (0.045) was lower than 0.05.

Discussion

The results of statistical analysis revealed that learners taking classes using a hybrid TBLT approach had better writing scores than learners taking classes using traditional language teaching approach. The first finding was shown by the descriptive test results where the mean score of the hybrid TBLT group was higher than that of traditional language teaching group ($78.39 > 72.29$). Also, the two-way ANOVA test showed that there was a significant difference in writing performance between learners taught by the hybrid TBLT approach and learners taught by traditional language teaching approach because the F-value (4.79) was higher than the F-table (2.76). It meant that there was a significant effect of the hybrid TBLT approach on writing performance. This finding is supported by previous literature (Adams, Amani, Newton & Alwi, 2014) exploring the effect of the use of hybrid TBLT on writing skills. Their studies also found that a hybrid TBLT approach was effective for enhancing writing performance.

Learners taking classes with a hybrid TBLT approach could have got better writing performance for several reasons.. First, using Google Classroom increased learners' motivation and participation in the language classroom. Most learners took an active part and were motivated in writing processes assisted with the Google Classroom tool. This finding is supported by other findings (Heggart & Yoo, 2018; Jafarian, Soori, & Kafipour, 2012) explaining that the use of Google Classroom in language learning correlated with improved learner participation and classroom dynamics. Google Classroom functions provided the possibility for private comments or feedback from the teacher which meant that learners could directly revise errors made in their writing.

Second, English learners were engaged in the hybrid learning process. College teacher-learners and learner-learner classroom discussions were alive both when collaborating face-to-face and in online discussions. This finding was in line with a previous study (Purnawarman, Susilawati & Sundayana, 2016) exploring the effect of hybrid learning on learner engagement. The studies showed that hybrid learning facilitated learner engagement during classroom sessions. The learners' writing performance will be better if they were engaged in the learning processes. Peer drafts and revisions in online writing promoted learner engagement since these conditions motivated them to discuss their writing.

The second finding of the study revealed that the learners with high critical thinking skills achieved better writing performance than learners with low critical thinking skills after taking classes with hybrid TBLT. The descriptive analysis showed that the mean score of the high critical thinking group (79.72) was higher than that of the low critical thinking group (74.93). This finding was consistent with a prior study (Golphour, 2014) which explained that critical thinking and writing skills were correlated in language learning. The results of the F-value computation (4.01) showed that there was a significant difference in writing performance between learners who have high critical thinking skills and learners who have low critical thinking skills. This meant that there was a significant effect of critical thinking on writing performance.

The high critical thinking group could have achieved better writing performance for several reasons. First, EFL learners were asked to write some arguments related to the topic in the expository texts. Critical thinking skills were correlated with the abilities to write arguments. This was in agreement with previous literature (Nejmaouni, 2018) which investigated the effect of critical thinking on argumentative writing. This finding clearly indicates that critical thinking is associated with learners' ability to write arguments or opinions related to writing tasks.

Second, learners' critical thinking skills developed better due to face-to-face and online small group discussions. The two modes of discussion were effective for improving learners' critical thinking in writing classes. Consistent with previous studies (Iman, & Angraini, 2019; Jones, 2014), the results illustrated that group discussion in hybrid settings could promote learners' critical thinking. This meant that the teaching strategy used was successful for developing both writing performance and critical thinking skills.

Conclusions

The findings of this study highlight that organizing learners' tasks in small group discussions during both face-to-face and online activities can promote EFL learners' writing performance. It also illustrates that learners with high critical thinking skills achieve better writing performance than learners with low critical thinking skills. The results indicate that hybrid task-based language teaching and critical thinking have a significant effect on EFL writing performance. The results of this study suggest college teachers should set up language learning facilitated with the Google Classroom tool. Similarly, it provides information for Indonesian learners showing how to apply Google Classroom in writing English texts. Learners need

to motivate themselves to take part actively during both face-to-face and online discussions in order to enhance the quality of their writing. Further studies need to be conducted to allow deeper investigation of other variables such as motivation, anxiety, self-efficacy, and self-esteem involving larger samples.

Acknowledgements

The authors would like to express their gratitude to *Indonesia Endowment Fund for Education* for financially supporting this research.

References

- Abbasi, A., & Izadpanah, S. (2018). The relationship between critical thinking, its subscales and academic achievement of English language course: The predictability of educational success on critical thinking. *Academic Journal of Educational Sciences*, 91–105. doi: 10.31805/acjes.445545
- Adams, R., & Nik, A.N.M. (2014). Prior knowledge and second language task production in text chat. In M. González-Lloret & L. Ortega (Eds.), *Technology-mediated TBLT: Researching technology and tasks* (pp. 51–78). Amsterdam: John Benjamins.
- Adams, R., Amani, S., Newton, J. & Alwi, N. (2014). Planning and production in computer-mediated communication (CMC) writing. In Byrnes, H., & Manchón, R.M. (Eds.), *Task-based Language Learning—Insights from and for L2 Learning* (pp. 137–162). Amsterdam: John Benjamins.
- Aghajani, M., & Adloo, M. (2018). The effect of online cooperative learning on Students' writing skills and attitudes through telegram. *Instructional Journal of Instruction*, 11(3), 433–448. doi: 10.12973/iji.2018.11330a
- Al Mubarak, A.A. (2017). An investigation of academic writing problems level faced by undergraduate students at Al Imam Al Mahdi University-Sudan. *English Review: Journal of English Education*, 5(2), 175–188. doi: 10.25134/erjee.v5i2.533
- Anderson, P., Anson, C.M., Gonyea, R.M., Paine, C. (2015). The contributions of writing to learning and development: Results from a large-scale multi-institutional study. *Research in the Teaching of English*, 50(2), 199–235.
- Baralt, M., & Gomez, J.M. (2017). Task-based language teaching online: A guide for teachers. *Language Learning and Technology*, 21(3), 28–43.
- Brown, H.D., & Abeywickrama, P. (2010). *Language assessment: Principles and classroom practices (2nd Ed.)*. New York: Pearson Education, Inc.
- Chong S.W., & Reinders H. (2018). Technology-mediated task-based language teaching: A qualitative research synthesis. *Language Learning & Technology*, 24(3), 1–18.
- Escorcía, D. (2015) Teaching and assessing writing skills at university level: a comparison of practices in French and Colombian universities. *Educational Research*, 57(3), 254–271. doi: 10.1080/00131881.2015.1056641.

- Facione, P.A. (2015). *Critical thinking: What it is and why it counts*. California: Measured Reasons LLC.
- Garrison, D.R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *Internet and Higher Education*, 7, 95–105. doi: 10.1016/j.iheduc.2004.02.001.
- Golpour, F. (2014). Critical thinking and EFL learners' performance on different writing modes. *Journal of Pan-Pacific Association of Applied Linguistics*, 18(1), 103–119.
- Hassana, R.A. (2014). Blended learning: Issues and concerns. *Discovery*, 3(7), 5–9.
- Heggart, K.R., & Yoo, J. (2018). Getting the most from Google Classroom: A pedagogical framework for tertiary educators. *Australian Journal of Teacher Education*, 43(3), 140–153. doi: 10.14221/ajte.2018v43n3.9
- Iman, J.N., & Angraini, N. (2019). Discussion task model in EFL classroom: EFL learners' perception, oral proficiency, and critical thinking achievements. *Pedagogika*, 133(1), 43–62. doi: 10.15823/p.2019.133.3
- Ismail, N., Hussin, S., & Darus, S. (2012). ESL tertiary students' writing problems and needs: Suggested elements for an additional online writing program (IQ-Write) for the BEL 311 course. *International Journal of Learning*, 18(9), 69–80. doi: 10.18848/1447-9494/CGP/v18i09/47748
- Jafarian, K., Soori, A., & Kafipour, R. (2012) The effect of computer assisted language learning (CALL) on EFL high school students' writing achievement. *European Journal of Social Sciences*, 27(2), 138–148.
- Jones, J.M. (2014). Discussion group effectiveness is related to critical thinking through interest and engagement. *Psychology Learning and Teaching*, 13(1), 12–24. doi: 10.2304/plat.2014.13.1.12
- Lai, C., & Li, G. (2011). Technology and task-based language teaching: A critical review. *CALICO Journal*, 28(2), 498–521. doi: 10.11139/cj.28.2.498-521
- Lumpkin, A. (2015). Enhancing undergraduate students' research and writing. *International Journal of Teaching and Learning in Higher Education*, 27(1), 130–142. doi: 10.1080/07303084.2004.10607300.
- McNaught, K., & Benson, S. (2015). Increasing student performance by changing the assessment practices within an academic writing unit in an Enabling Program. *The International Journal of the First Year in Higher Education*, 6(1), 73–87.
- Mehta, S.R., & Al-Mahrooqi, R. (2014). Can thinking be taught? Linking critical thinking and writing in an EFL context. *RELC Journal*, 1–14. doi: 10.1177/0033688214555356
- Nasution, N.B. (2019) Effect of case study and concept map on critical thinking skills and dispositions in Indonesian college students. *The New Educational Review*, 55(1), 64–76. doi: 10.15804/tner.2019.55.1.05
- Nejmaouni, N. (2018). Improving EFL learners' critical thinking skills in argumentative writing. *English language teaching*. 12(1), 98–109. doi: 10.5539/elt.v12n1p98
- Oskoz, A., & Elola, I. (2014). Promoting foreign language collaborative writing through the use of Web 2.0 tools and tasks. In Gonzalez-Lloret, M., & Ortega, L. (Eds.), *Technology-mediated TBL*. (pp.115–148). Amsterdam: John Benjamins.

- Park, M. (2012). Implementing computer-assisted task-based language teaching in the Korean secondary EFL context. In Shehadeh, A., & Coombe, C.A. (Eds.). *Task-Based Language Teaching in Foreign Language Contexts*. (pp.215–240). Amsterdam: John Benjamins.
- Purnawarman, P., Susilawati, & Sundayana, W. (2016). The use of Edmodo in teaching writing in a blended learning setting. *Indonesian Journal of Applied Linguistics*, 5(2), 242–252. doi: 10.17509/ijal.v5i2.1348
- Rahmatunisa, W. (2014). Problems faced by Indonesian EFL learners in writing argumentative essays. *English Review: Journal of English Education*, 3(1), 41–49.
- Ramezani, R., Larsari, E.E., & Kiasi, M.A. (2016). The relationship between critical thinking and EFL learners' speaking ability. *English Language Teaching*, 9(6), 189–198. doi: 10.5539/elt.v9n6p189
- Silva, R.D. (2015). Writing strategy instruction: Its impact on writing in a second language for academic purposes. *Language Teaching Research*, 19(3), 1–15. doi: 10.1177/1362168814541738
- Tavakoli, H., Lotfi, A.H., Biria, R., & Shuyan Wang. (2019) Effects of CALL-mediated TBLT on motivation for L2 reading, *Cogent Education*, 6(1), 1–21. doi: 10.1080/2331186X.2019.1580916
- Tyas, A.S.P., Muam, A., Sari, Y.I.H., & Dewantara, C. (2020). The effectiveness of blended learning in improving students' workplace communication skills: A case study on OLIVE website test result. *Lingua Cultura*, 14(1), 1–12. doi: 10.21512/lc.v14i1.6130
- Wang, S., & Seepho, S. (2016). The development of critical thinking in EFL reading with Chinese students: Reducing the obstructive effect of English proficiency. *Social Science*, 10(2), 33–51.
- Zabihi, R. (2017). The Role of cognitive and affective factors in measures of L2 writing. *Written Communication*, 35(1), 1–26. doi: 10.1177/0741088317735836

Impact of Jigsaw Cooperative Learning Technique on Enhancing Kuwait English Language Student-teachers' Speaking Skills

DOI: 10.15804/tner.2020.61.3.10

Abstract:

This quasi-experiment examined the impact of the jigsaw cooperative learning technique on enhancing the speaking skill of Kuwaiti student-teachers of English. In the first semester of 2019/2020, 40 female students enrolled in a Conversation Course were divided equally into control and experimental groups based on an oral presentation task (pre-test). Data was assessed through a speaking skill competency rubric (vocabulary, accuracy, fluency, and pronunciation). The post-test results indicated statistically significant differences between the means of the participants in favor of the experimental group. A pre-post experiment questionnaire was also administered to identify students' attitudes towards the jigsaw technique. SPSS program was used for data analysis. The t-test results showed a positive attitude of the experimental group towards cooperative learning and the jigsaw technique. It is recommended to use the jigsaw technique to improve students' speaking skills.

Key words: *Cooperative Learning, Jigsaw Technique, English Student-teachers, Speaking Skill, Kuwait*

Introduction

Speaking is an important skill for students of English needing to engage in different interactive activities. Students are expected not only to communicate

with others but also to be able to share the information obtained with other speakers. Nunan (1991, p. 23) defines speaking as the “ability to express oneself in the situation, or the activity to report acts, or situation in precise words or the ability to converse or to express a sequence of ideas fluently”. Thus, to be a good language speaker, it is necessary to reach an acceptable level of accuracy and fluency (Kao & Craigie, 2010). This can be achieved by providing language students with opportunities that promote their interaction (Brown, 2007). However, this is challenging for language students who are reluctant to take part in interactive speaking classroom activities due to their low language proficiency (Chen & Chang, 2009). Ur (1996, p.121) explains that “learners are often inhibited about trying to say things in a foreign language in the classroom: worried about making mistakes, fearful of criticism or losing face, or simply shy of the attention that their speech attracts”. Such issues can make language students silent or speak less when language teachers dominate the speaking activities which lead to a teacher-centered classroom (Pappamihiel, 2002), as students are dealt with as passive learners (Ning, 2011). Without doubt this negatively affects students’ confidence to participate (Gomleksiz, 2007). Yet, the teacher-centered model has shifted to a learner-centered model (Nunan, 1988). This shift has a positive impact on language students’ speaking skill and classroom participation (Kao & Craigie, 2010). However, students are still reluctant to participate as they find it difficult to speak and express themselves (Rashedi, 2017). Thus, to benefit from this shift in learning, it is necessary to adopt an alternative model to promote student speaking other than traditional speaking instruction. Based on research, cooperative learning with its varied techniques including jigsaw is a promising alternative to achieve the expected speaking proficiency (Ning, 2011). Ahmed & Bedri (2017) investigated the effects of cooperative learning on undergraduate learners’ oral skills in Khartoum. The experimental group showed improvement in their speaking performance. They were more motivated, less reluctant, and had a positive attitude towards cooperative learning activities. Cooperative learning has been found to be an effective learning strategy which improves students’ attitudes towards learning (Salvin, 1995).

Problem of Research

Speaking is an important language skill that needs to be mastered to reflect students’ abilities to use the language proficiently. This is even more important for English language student-teachers who need to communicate and express

themselves fluently and professionally as future language teachers. At Kuwait University, the purpose of the Conversation Course is to provide student-teachers with opportunities to speak and use the language productively and accurately. However, many English language student-teachers are not able to communicate fluently and easily. This creates a barrier which inevitably reduces effective interaction and negatively affects their future teaching performance. This study aims to examine the impact of jigsaw as a cooperative learning technique on enhancing the speaking skill of English language student-teachers with a focus on fluency, accuracy, use of vocabulary, and correct pronunciation.

Research Questions

The study attempts to answer the following questions and tests the related null hypotheses:

- 1) What is the impact of the jigsaw technique on Kuwaiti female English language student-teachers' appropriate practice of vocabulary, accuracy, fluency and pronunciation during speaking tasks?
- 2) What are the attitudes of the participants regarding the jigsaw technique?

The study tests the following null hypotheses at the significance level of $p=0.05$:

- 1) There are no statistically significant differences in the mean scores of control and experimental groups on the oral proficiency test.
- 2) There are no statistically significant differences in the mean scores of the participants' attitude based on the pre-post experiment results.

Research Focus

Cooperative learning has several techniques that foster students' interaction, one of which is jigsaw. Brown (2007) explains that the jigsaw technique is a form of information gap that encourages students to cooperate and share the needed piece of information to fill in the gap and complete the task. This encourages social interaction among the group members (Salvin, 1995). According to Gregory and Chapman (2007) jigsaw encourages a shared responsibility model of learning with a focus on the inter and intra-personal skills of the students which are valuable to the learning process. Social skills will be gained as students are encouraged to listen to each other and exchange their thoughts aloud (Johnson & Johnson, 2002). This eventually will help to develop students' language skills.

Several studies have been conducted to test the impact of jigsaw on students speaking skills. Erfiani and Neno (2018) explored the effect of jigsaw on improving students' vocabulary ability at Timor University in Indonesia. They found that the jigsaw technique improved students' vocabulary and their interaction with their teacher and other students. Rimani Nikou, Alavinia, Karimzadeh (2013) conducted an experimental study on 32 female students and found out that there was a statistically significant difference in the mean scores in favor of the experimental group's speaking ability as they outperformed the control group and obtained a higher average score. Lin (2010) investigated the perspectives of Taiwanese teachers and students towards the use of jigsaw technique in first-year university level English classrooms. The results showed it had significantly contributed to the experimental group. Regardless of whether participants expressed positive or negative opinions, both groups expressed their willingness to continue adopting jigsaw in their future English classes. In addition, the jigsaw technique has been found to have a positive impact on improving English Language students' participation and enthusiasm (Mengduo & Xiaoling, 2010), and students' academic achievement (Evcim & İpek, 2013).

Methodology of Research

General Background of Research

This quasi-experimental study aimed to examine the impact of the jigsaw cooperative learning technique on enhancing the speaking skill of Kuwaiti student-teachers of English.

Sample of Research

The sample consisted of 40 female Kuwaiti student-teachers of English enrolled in a Conversation for the Language Teachers Course in the first semester of 2019/2020. They were in their second year of study at the College of Education at Kuwait university. They were divided equally into two groups, control and experimental. The participants were homogeneous with regard to age, ranging from 19 to 20 years old, gender, mother tongue (Arabic), exposure to English and educational and cultural background. However, they were heterogenous with respect to their language proficiency. The purpose of the study was explained to the experimental group, and their consent to take part in it was obtained.

Instrument and Procedures

Instrument

Two research instruments were used. The first was a speaking test used as a pre-post-test with three tasks (presenting an educational game, commenting on an educational YouTube video, and presenting a teaching technique) to measure their English-speaking performance. A speaking skill competency rubric was developed to measure the quality of performance based on four criteria: vocabulary, accuracy, fluency, and pronunciation with a four-rating scale of fair, adequate, good, and excellent. To establish the reliability of the first instrument, it was checked through a test-retest method. The test was administered twice with a pilot group of 20 students within a span of 7 days to calculate the correlation coefficient between the two sets of scores, which was found to be 0.96, which is an acceptable value. In addition, inter-rater reliability which is the degree of agreement between the two test-retest scores was checked. The correlation coefficients obtained for the two scores were 0.911 and 0.915 which indicated high inter-rater reliabilities. Thus, the test was reliable and valid as a research tool.

The second instrument was an eight item attitude questionnaire on a 3-point-Likert scale ranging from 1 „agree”, to 3 „disagree” which was developed by the researcher based on reviewing relevant literature. It was used to identify students' attitude on the use of cooperative learning. Means, standard deviations, and t-test were calculated and analyzed using SPSS program. The validity of the questionnaire was verified by 4 faculty members from the College of Education at Kuwait University. The questionnaire reliability coefficient of Cronbach's alpha was 0.87, with a mean of 3.76 and a standard deviation of 1.27, which was suitable for the study.

Procedures

The participants were divided into two groups, control and experimental. They were introduced to the same speaking topics and had a six-week treatment period with 18 hours of speaking classes, each of which lasted one hour. The control group attended classes following the traditional method of teaching and received instructions on assigned topics to prepare at home, and their participation was through making oral presentations and taking part in class discussions. Students were given the opportunity to ask questions and get answers from their professor (the researcher) and their classmates. The experimental group was introduced to the jigsaw technique and how to participate accordingly. Students were divided into five groups of four students each with different speaking skill levels based on

their previous speaking test results. For the first 20 minutes of class time, students with the same segment of the discussed topic had to join the expert group to discuss the topic in details. For the second 20 minutes, they rejoin their jigsaw groups to share their in-depth ideas with their group members. In the last 20 minutes of class, the jigsaw groups shared the results of their experience orally with their other classmates. This guaranteed that the entire class took part in the oral activities related to the discussed topic. The researcher's role was to monitor and assess students during class time to ensure that all students were participating. The researcher assessed students based on their choice of relevant vocabulary, accuracy, fluency, and pronunciation. Student were allocated 5 minutes to give an oral presentation in front of their classmates in the next class meeting. Both groups responded to the questionnaire before and after the experiment to find out their attitudes towards the jigsaw technique and its impact on enhancing their speaking skill.

Data Analysis

Pretest-posttest method was applied to analyze the study results. Data analysis was run by using SPSS (25.0) and the significance level of $p = 0.05$ was adopted. Mean scores, and standard deviations were calculated. A t-test was conducted to evaluate the impact of jigsaw on enhancing the speaking performance of the experimental group as compared with the performance of the control group. As well, the t-test was used to compare the pre-post questionnaire results.

Research Results and Discussion

This section provides answers to the two research questions raised and the related null hypotheses.

The First Research Question

Light will be shed on the first question: (what is the impact of the jigsaw technique on Kuwaiti female English language student-teachers' appropriate practice of vocabulary, accuracy, fluency and pronunciation during speaking tasks?) and the null hypothesis is: "there are no statistically significant differences in the mean scores of the control and experimental groups on oral proficiency test. Table 1 presents the pre-test results of the control and the experimental groups".

As seen in Table 1, the mean scores were of similar levels in both groups. There were no statistically significant differences in the performance of the student-teachers in both groups as the values were greater than the statistical significance level $p = 0.05$. This meant that both groups demonstrated similar levels

Table 1. Pre-tests of the Control and Experimental Groups

Speaking Competencies	Groups	Mean	Stand. Dev.	T	df	Sig. (2-tailed)
Vocabulary (use of variety of relevant vocabulary and expressions)	Control	2.725	0.694	0.363	38	0.971
	Experimental	2.743	0.754			
Accuracy (correct use of grammatical rules)	Control	2.850	1.197	0.328	38	0.794
	Experimental	2.773	0.975			
Fluency (fluent and smooth speaking)	Control	2.467	0.764	0.434	38	0.977
	Experimental	2.474	0.969			
Pronunciation (correct pronunciation and intonation)	Control	3.797	1.062	1.495	38	0.395
	Experimental	3.402	1.148			

of their English language speaking competencies with reference to their use of vocabulary, correct grammar, fluency, and correct pronunciation. Thus, there was no group favored over the other.

Results of Testing the Null Hypothesis of the first study:

The study null hypothesis is as follows: there are no statistically significant differences in the mean scores of the control and experimental groups on oral proficiency test. To find out the impact of the jigsaw technique on the experimental group compared to the control group, the null hypothesis was tested. Table 2 represents the post-test results.

Table 2. Post-test Results of the Control and Experimental Groups

Speaking Competencies	Groups	Mean	Stand. Dev.	T	df	Sig. (2-tailed)
Vocabulary (use of variety of relevant vocabulary and expressions)	Control	2.488	0.584	3.231	38	0.002*
	Experimental	2.842	0.628			
Accuracy (correct use of grammatical rules)	Control	2.219	0.948	4.454	38	0.000*
	Experimental	3.096	1.161			
Fluency (fluent and smooth speaking)	Control	2.249	0.683	2.198	38	0.029*
	Experimental	2.552	0.819			
Pronunciation (correct pronunciation and intonation)	Control	3.579	1.089	2.300	38	0.024*
	Experimental	3.978	1.020			

Table (2) shows that the post-test mean scores of the experimental group were far better than those of the control group. The post-test revealed that the application of the jigsaw technique had improved the speaking competencies of the experimental group in their use of vocabulary, correct grammar, fluency, and correct pronunciation. Notably, the significance levels of the experimental group variables in the four speaking skill competencies were less than the significance level $p=0.05$, which meant that there were statistically significant differences attributed to the learning method, i.e. the jigsaw. Thus, the null hypothesis was rejected.

The Second Research Question:

The following section provides answers to the second research question and the related null hypothesis which is as follows: “what are the attitudes of the participants regarding the jigsaw technique?” and the null hypothesis is “there are no statistically significant differences in the mean scores of the participants’ attitudes based on the pre-post experiment results”. Table 3 presents the mean scores and standard deviations of both the control and experimental groups in the pre-post experiment questionnaire results to find out their attitudes towards the jigsaw technique.

Table 3. Control and Experimental Groups Pre-Post Questionnaire Results

Questionnaire Items	Pre-test				Post-test			
	Control		Experimental		Control		Experimental	
	Mean	Stand. Dev.	Mean	Stand. Dev.	Mean	Stand. Dev.	Mean	Stand. Dev.
1) Cooperative Learning makes learning easier	2.386	0.651	2.427	0.598	2.471	0.746	3.542	1.090
2) Cooperative Learning enhances class participation	2.068	0.938	2.047	1.140	2.450	0.827	3.970	0.968
3) Cooperative Learning enhances good working relationships.	2.0293	0.778	2.506	0.790	2.837	1.164	3.768	1.143
4) Students who work together achieve more than when they work alone	2.469	1.215	2.538	1.023	2.615	0.660	3.835	1.134
5) Jigsaw technique helped in gaining vocabulary	2.257	0.964	2.704	0.533	2.478	0.613	3.683	0.960
6) Jigsaw technique helped in using correct grammatical rules	2.624	1.118	2.970	1.998	2.355	0.805	3.852	1.113

7) Jigsaw technique helped in speaking fluently and smoothly	2.773	0.975	2.854	1.196	2.630	0.740	2.998	1.188
8) Jigsaw technique helped in improving my pronunciation	2.405	1.148	2.973	1.062	2.295	0.700	3.957	1.020

Table 3 showed that the mean scores of both the control and experimental groups were of similar level in their responses to the pre-experiment questionnaire. The data suggested that both groups were similar in their attitudes towards the jigsaw technique before starting the experiments. However, the mean scores of the experimental group were higher than those of the control group in the post-experiment questionnaire, which indicated that student-teachers in the experimental group benefited from the jigsaw technique in enhancing their speaking skill competencies and outperformed the control group.

Results of Testing the Second Study's Null Hypothesis:

The study null hypothesis is as follows: there are no statistically significant differences in the mean scores of the participants' attitude based on the pre-post experiment results. To determine if there was a significant statistical difference between student-teachers in the control and experimental groups, a t-test was conducted at both levels i.e., pre- and post- experiment questionnaires. The results obtained enabled us to test the null hypothesis of the second research question. Tables (4 and 5) present the pre-post experiment questionnaire results using the t-test.

Table 4. Pre-Experiment Students' Attitudes Questionnaire Results

Group	Number of Participants	Mean	Stand. Dev.	T	df	Sig. (2-tailed)
Control	20	2.384	1.582	1.684	38	0.582
Experimental	20	2.536	0.876			

Table 4 showed that there were no statistically significant differences in the attitudes of the two groups towards the jigsaw before carrying out the experiments. The significance level of the pre-experiment result 0.582 was higher than the significance level $p=0.05$. It can be judged that the two groups were at similar level of attitudes towards cooperative learning and the jigsaw technique before conducting the experiment.

Table 5. Post-Experiment Students' Attitudes Questionnaire Results

Group	Number of Participants	Mean	Stand. Dev.	T	df	Sig. (2-tailed)
Control Group	20	2.521	1.324	1.963	38	0.026*
Experimental	20	3.882	0.568			

Table 5 showed that there were statistically significant differences with reference to the post-experiment questionnaire in favor the experimental group. The mean score of the experimental group was 3.882 with a standard deviation of 0.568, while the mean score of the control group was 2.521, with a standard deviation of 1.324. This suggested that the experimental group benefited from learning using the jigsaw technique compared with the control group students who were taught by traditional teaching method. Notably, the significance level of the post experiment 0.026 was less than the significance level $\alpha=0.05$. Thus, the null hypothesis was rejected.

Conclusion

This study was conducted to examine the impact of jigsaw cooperative learning technique on enhancing the speaking skill of Kuwaiti English language student-teachers. The statistical analysis of the pre-test scores indicated that the control and experimental groups showed equivalent levels of their speaking performance. However, the post-test results confirmed that there was a significant increase in the speaking performance of the experimental group at the significance level of $\alpha=0.05$, and that was seen in their increased speaking abilities. The participants were able to speak fluently and accurately with correct use of vocabulary, and correct pronunciation. Such results were in accordance with those of Erfiani and Neno (2018) and Rimani Nikou, Alavinia, and Karimzadeh (2013) as their participants showed improvement in their vocabulary ability and interaction with their teachers and classmates. In addition, their social skills with their classmates became better and they gained self-confidence to speak in front of the class as indicated by Salvin (1995), Johnson & Johnson (2002), and Gregory and Chapman (2007). The findings contradicted with those of Rashedi (2017) and Gomleksiz (2007) who concluded that their students were reluctant to participate as they found difficulty in speaking and expressing themselves. Thus, the first study null hypothesis was rejected.

In addition, the post-test questionnaire results show that the experimental group had positive attitudes towards the jigsaw technique compared with their pre-test results which were similar to the control group in the pre-test. This supports the findings of Mengduo and Xiaoling (2010) that the jigsaw technique had a positive impact on improving English Language students' participation and enthusiasm. However, the control group scored similar results in the pre-posttest as they did not experience learning with the jigsaw technique. Thus, the second null hypothesis was rejected as well.

Finally, the results of this study indicated the advisability of applying the jigsaw technique to enhance the speaking skill of English language student-teachers. The study drew attention to the importance of speaking as a fundamental skill of the English language. The findings supported what the literature indicated about the effectiveness of using cooperative learning and the jigsaw technique in developing the speaking skill.

Based on the study findings, three important recommendations are highlighted:

1. Language teachers at university level and public schools should employ this technique to teach the speaking skill because it is more effective than traditional teaching methods.
2. Workshops and training sessions should be held about how to apply the cooperative learning and the jigsaw technique.
3. Future studies should be conducted to identify the effectiveness of the jigsaw technique in teaching other language skills, such as reading and writing.

References

- Ahmed, S., & Bedri, A. (2017). The role of cooperative learning in enhancing EFL learners' oral communication skills. *International Journal of English Language, Literature and Translation Studies*, 4 (1), 33–40.
- Brown, H. (2007). *Principles of language learning and teaching* (5th ed.). White Plains, NY: Pearson Education Inc.
- Chen, I., & Chang, C. (2009). Cognitive load theory: An empirical study of anxiety and task performance in language learning. *Electronic Journal of Research in Educational Psychology*, 7 (2), 729–746.
- Erfiani, Y., & Neno, H. (2018). The effect of jigsaw method to improve EFL students' vocabulary ability. *Metathesis: Journal of English Language Literature and Teaching*, 2 (2), 171–183.
- Evcim, H., & İpek, Ö. (2013). Effects of jigsaw II on academic achievement in English prep classes. *Procedia Social and Behavioral Sciences*, 70 (1), 1651–1659.

- Gregory, G., & Chapman, C. (2007). *Differentiated instructional strategies: One size fits all*. Thousand Oaks, Calif: Corwin Press.
- Gomleksiz, M. (2007). Effectiveness of cooperative learning (jigsaw II) method on teaching English as a foreign language to engineering students (Case of Firat University, Turkey). *European Journal of Engineering Education*, 32 (5), 613–625.
- Johnson, D., & Johnson, R. (2002). Cooperative learning methods: A meta-analysis. *Journal of Research in Education*, 12 (1), 5–24.
- Kao, P., & Craigie, P. (2010). Foreign language anxiety and English achievement in Taiwanese undergraduate English-major students: An empirical study. *Hung Kuang Journal*, 61, 49–62.
- Lin, L. (2010). Perspectives of teachers and students toward cooperative learning jigsaw tasks in Taiwanese EFL classrooms. (Doctoral Thesis).
- Mengduo, Q., & Xiaoling, J. (2010). Jigsaw strategy as a cooperative learning technique: focusing on the language learners. *Chinese Journal of Applied Linguistics*, 33 (4), 113–125.
- Ning, H. (2011). Adapting cooperative learning in tertiary ELT. *ELT Journal*, 65 (1), 60–70.
- Nunan, D. (1988). *The learner-centred curriculum*. Cambridge: Cambridge University Press.
- Nunan, D. (1991). *Research methods in language learning*. Cambridge: Cambridge University Press.
- Pappamihel, N. (2002). English as a second language students and English language anxiety: Issues in the mainstream classroom. *Research in the Teaching of English*, 36 (3), 327–355.
- Rimani Nikou, F., Alavinia, P., & Karimzadeh, N. (2013). The Effect of using jigsaw to enhance female Iranian intermediate EFL learners' oral proficiency. *Australian Journal of Basic and Applied Sciences*, 7 (9), 315–326.
- Rashedi, M. (2017). Why do Kuwaiti students in the College of Arts think that learning English is both difficult and unnecessary? *European Journal of English Language Teaching*, 2 (3), 68–82.
- Slavin, R. (1995). *Cooperative learning: Theory, research, and practice* (2nd ed.). Needham Heights, MS: Allyn and Bacon.
- Ur, P. (1996). *A course in language teaching: Practice and theory*. New York: Cambridge University Press.

Acknowledgement

I would like to thank the participants in this study for taking part and making this study possible.

2021 New
E|Educational
Review



**Social
Pedagogy**



Hu Lianqing
China, United Kingdom

Ismail Adelopo
United Kingdom

Kathryn Last
United Kingdom

Understanding Students' Critical Thinking Ability: A Comparative Case of Chinese and British Undergraduates

DOI: 10.15804/tner.2020.61.3.11

Abstract

The purpose of this study was to investigate to what extent the language factor contributes to students' critical thinking abilities. The critical thinking (CT) skills and abilities of final year undergraduate students studying on the same program were tested using a modified Watson-Glaser Critical Thinking Appraisal questionnaire. The students were divided into two groups: a Chinese-educated group and native-speaking and British-educated one. The results indicated that the overall CT skills of the English-speaking students are higher than those of Chinese students and especially in certain aspects of the appraisal. It was also found that Chinese students performed better when completing the appraisal in their native language.

Key words: *Critical Thinking; Language factor; Chinese learners; International Learning;*

Introduction

With the increasing number of Chinese students studying abroad in western universities, there is a growing number of criticisms from western professors raising concerns about a lack of CT ability among Chinese students (Heng, 2016; Clark & Gieve, 2006; Paton, 2005). These concerns have been supported by some previous studies which suggest that students from Asia are generally weak in critical think-

ing, especially when compared to their counterparts in Anglophone countries (e.g. Atkinson, 1997; McBride et al., 2002; Turner, 2006). McBride *et al.* (2002) in their comparative study of pre-service teachers' dispositions towards critical thinking in the USA and China, attribute the lower scores obtained by the Chinese sample to the cultural system in China that discourages independence of thought.

Some studies, however, found that the concept of CT is not alien to Chinese students, and that they can demonstrate CT when teaching is effective (Dong, Anderson, Kim, & Li, 2008; Yang, 2016). This suggests that one's CT skills can be improved providing appropriate measures have been taken. In recent years, Chinese experts and scholars have thought that some Chinese college students suffer from „Speculative Absence” (Huang Yuanshen, 2010, pp. 11–16), which refers to students' lack of analytical, judgmental, reasoning and discriminatory skills. Some studies conducted by Chinese scholars also showed that Chinese students generally do not have positive dispositions towards CT (He, Zhang, & Zhao, 2006; Zhu, Feng, & Yan, 2005). However, these studies have been qualitative and have not focused on the factors accounting for this difference. By contrast, this study employs a quantitative approach to generate deeper understanding of the difference between two cohorts of students, those that have been educated mainly in the UK and one that has been mainly educated in China, studying in the same final year module at a UK university. Students from both groups were invited to participate in filling the simplified version of the Watson-Glaser Critical Thinking Appraisal questionnaire (WGCTA Form S; Watson, 1994). The questionnaire responses were analyzed to identify the differences in CT skills in the two groups, based on nationality and language proficiency.

Literature review: CT and culture

Norris (1985:40–45) describes CT as students' implementing everything they already know, and evaluating and changing their own opinions. In Fisher's (2011) opinion, CT involves a set of strategies to help students develop reflective analysis and evaluation of interpretations or explanations, including their own, to decide what to believe or what to do. However, many researchers maintain that there are varied conceptions and manifestations of CT and that they are shaped by diverse cultures (e.g. Atkinson, 1997; McGuire, 2007; Tan, 2017a, b). The word 'culture' here is taken to refer to a set of attitudes, values, beliefs, assumptions and behaviors shared by a group of people down the generations via symbols, language, rituals and material objects (Hofstede, 1991). Many researchers believe that culture is a key factor influencing individual CT skills (Pennycook 1996, Atkinson 1997, Canagarajah 2002). Atkinson (1997) claimed that CT is a unique western idea and

incompatible with Asian collectivist traditions, and stated that Chinese students in 'western' universities have difficulties with creative and innovative writing, and that they are reticent in class. He attributed this phenomenon to the influence of traditional Chinese culture on Chinese students and claimed that CT is culturally based, and specifically that Chinese culture is not conducive to the development of CT skills. Thus, Atkinson argued that CT is culture specific and a kind of social practice. Atkinson's argument has been echoed by a number of scholars such as Pennycook (1996) and Canagarajah (2002), who argue that CT is very much a western notion, and by Wan (2001), who argued that Chinese cultural values may well affect students' learning styles.

This cultural influence might have played a part in restricting Chinese students' full CT development in respect of argumentation and talking back over several generations. Regarding Chinese traditional culture, Confucian teaching, for instance, encourages good students to be self-reflective, rather than simply inquisitive. According to Confucius, the exemplary student does not challenge the teacher with words. Instead, the student should reflect on him/herself and practice the learned philosophy through action. Pondering on problems quietly is valued more highly than asking the teacher many questions in Confucian cultures. Another well-known Confucian saying from *The Analects of Confucius* is that: "A superior man is reserved in speech but expeditious in action". (Yudan 2006, p. 126)

Paton (2005) on the other hand, claimed that Chinese students' lack of CT in academic writing in English is due more to insufficient knowledge in the subject area and English language deficiency rather than being culturally driven.

Our study looks to test Paton's theory as there appears to be limited quantitative research with regard to this. It is thought this study makes two main contributions to the literature. Firstly, the study advances the literature on CT skills by considering the impact of language as a defining factor for the difference in student CT skills. Secondly, whilst previous studies have focused on using a qualitative approach to understanding CT, the present study looks quantitatively at the impact of language on CT skills. The findings from this study have implications for teaching and learning in higher education in general and for Chinese-educated students in UK higher education in particular.

Research Design

As discussed there are multi-dimensional factors which influence students' CT skills including culture, knowledge of the subject area, target language proficiency,

disposition and cognitive or ability aspects. Yet, the extent to which these factors have been examined in relation to CT vary and remain unclear in the literature. Thus, the objective of the current study is to explore whether there is a disparity in CT capability between Chinese and English-speaking students in a UK University and whether the language factor influences the CT ability of Chinese students in this context..

The study was conducted in a UK University. The module that forms the data source for the study was a final year compulsory module for the award of a Bachelor Degree in Accounting and Finance. The accounting and finance department at the university has over 3000 students from all over the world and some 200 faculty members. The programme, as with many courses in UK universities, has a sizeable number of international students of which Chinese students constitute a significant part. Many Chinese students join in the second year as direct entrants and some join in the final year as part of a joint degree arrangement with universities in China. The university in which the research was conducted has a long history of collaboration with its Chinese counterparts and recognizes that international students struggle to understand the educational system and cultural norms in the country, so it organizes a welcome and induction programme for its international cohort to ease their integration and help them settle into their new learning environment.

Data for the study was obtained through a survey which was administered to both the Chinese and British cohorts in the university. Survey is a well-established and popular method of data collection for investigation, where participants' perception can be collected for a large number of participants. It is reliable, faster and often cheaper compared to other methods of data collection. However, there are different understandings of how to appropriately measure CT and as a result there are several instruments used for measuring students' CT disposition, or CT skills, such as the California Critical Thinking Disposition Inventory (CCTDI) (Facione, et al., 2001), WGCTA Form S (Watson, 1994) and the California Critical Thinking Skills Test (CCTST, 2008; Facione, 2002), which are all designed in English with Eurocentric or Western-centric perspectives. Thus, judging Chinese students' CT skills using these measures could disadvantage Chinese students. Based on the view that the WGCTA has been refined and tested and can be viewed as being culturally neutral (Grosser & Lombard, 2008), WGCTA, which was originally designed as a psychometrically derived measure comprising of 40 items in five sub-tests that address the theoretical concept of CT and issues of practical applications, was chosen in this study.

The participants in the survey were 120 undergraduate students aged from 21 to 23, studying Accounting and Finance, 60 native English-speaking students and 60 native Chinese-speaking students. They were recruited with the help of several colleagues who offered to distribute the appraisal forms after their classes. Although 120 questionnaires were handed out because some students failed to follow the instructions in the first part, only 100 valid questionnaires (50 native English-speaking students and 50 native Chinese-speaking students, including 47 males and 53 females) were used in the final analysis.

Given the fact that the language barrier was assumed to be the focal factor which may influence Chinese students' responses, the appraisal was translated to provide both English and Chinese versions with identical content in this research. Chinese students were required to take the English version first, then to respond to the same questions in the translated Chinese version in order to examine their real CT ability by comparing the score of the two versions. This allowed us to explore the disparity between native Chinese and English speakers in CT capability and the factors affecting the CT ability of Chinese undergraduates.

The Instruments: measurements and variables

The study used the WGCTA questionnaire to measure students' CT. There are two parts in the survey. The first includes information on demographic characteristics (nationality, age, gender, majors) and the second part contains 40 questions in five sub-scales. The 'Inference' sub-scale focuses on the correctness or incorrectness of an expression. In the 'Recognition of Assumption' sub-scale, the respondent is asked to identify the presence or absence of an assumption in an expression. In the 'Deduction' sub-scale, the respondent is required to determine extracted or non-extracted results from a situation. The 'Interpretation' sub-scale, looks for the ability to interpret and clarify by specifying the extracted or non-extracted interpretations of biographies and finally, 'evaluation of argument' determines detection of strong and weak evidence. In the 'inference' section, they need to judge if a statement is true or false after they finished reading four statements of fact. In 'Recognition of Assumptions', the four statements are followed by the proposed assumptions. The participants need to decide whether the assumption was 'made' or 'not made'. The 'Deduction' section consists of four premises followed by a suggested conclusion. The participants should think whether this necessarily follows from the premises given. The 'Interpretation' section is composed of four short paragraphs, each followed by suggested conclusions. The participants need to judge whether each of the proposed conclusions logically, beyond reasonable doubt, follows from the information given in the paragraph. In the 'Evaluation of

Arguments' section the participants are required to distinguish if the arguments are strong or weak. WGCTA is scored only for correct responses.

For this study the researcher only had access to the students for a limited time for them to complete the appraisal. Consequently, a decision to modify the form was made as it may take the participants' longer to complete the whole WGCTA Form S, and as a result this could decrease the number of completed appraisals. Although it was not possible to pilot the changes, the instrument was modified in such a way as to not compromise the main objective of the instrument. The five sections were retained but the number of questions in each were reduced to 4 questions per section and a total of 20 questions (shown in the appendix) down from 40 in the original question, which had 8 questions per section. The participants completed the questionnaire in the presence of the researcher. Therefore, scores were determined as numbers of correct responses/20×100%.

Ethical considerations

Permission for this research was obtained from the UK university's Ethics Committee. All participants were briefed on the purpose of the study and were given a complete guarantee of confidentiality that the questionnaires would be kept in confidence and in the possession of the researcher. Participation was entirely optional; there was no penalty for non-participation, and there was the option of voluntary withdrawal from the study before the completion of the project. Data generated from the research was stored on a university authorized computer with password protection.

Findings and discussion

The results of the Appraisal of CT study are presented in Table 1 where the percentage-correct score in each of the 5 sections of the WGCTA are shown for each group of students. The contents in each row are the scores on the five sub-scales of questions. The first row corresponds to the English students tested with the English version questionnaire (EE), the second row are the Chinese students with English version (CE) and the last row represents the Chinese students with Chinese version of questionnaire (CC). It shows scores in CT skills in 5 individual aspects and it shows that the mean score on the EE, CE and CC are 60%, 51%, and 54% respectively.

There is a difference in scores between native English-speaking students and native Chinese speaking students (60% vs. 51%) when completing the English

version of the appraisal, corresponding to other research results that show the CT skills of Chinese students are lower than that of the English-speaking students (Pennycook 1996, Atkinson 1997, and Canagarajah 2002). However, there is also a score disparity for Chinese students when the same questionnaire is given in different languages (51% for English version and 54% for its translation in Chinese), indicating there is a contribution of the language factor to the CT skills of Chinese students.

Table 1. Scores of questionnaire under three test settings

	Inference	Assumption	Deduction	Arguments	Interpretation	Average
EE	51%	72%	63%	50%	63%	60%
CE	59%	47.5%	57%	34%	60%	51%
CC	55%	51%	62.5%	41%	58%	54%

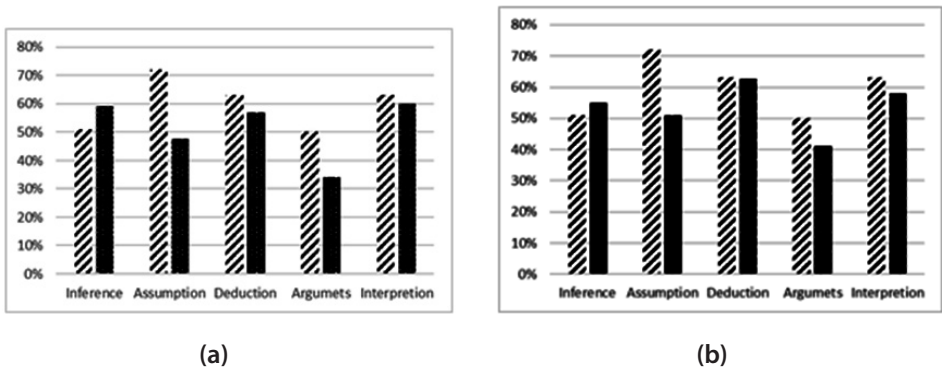


Figure 1. (a) CT skills of native speaking students (bars with striped fill) and their Chinese counterparts (bars with solid fill) when tested in English, and (b) CT skills of when both English and Chinese students are tested in the language of their own. Apparently the difference in (b) is less than that shown in (a)

To make comparison easier, the results have been illustrated as Figure 1, where the CT skills of both Chinese and English students using the test in English are shown in Fig.1(a). It is clearly seen the CT skills of English students (bars with striped fill) are higher than that of Chinese students (bars with solid fill). Similarly, the results of students tested in their own language, shown in Fig.1(b), clearly demonstrated better results. According to the “Average” column in Table 1, the critical skills of Chinese students are calculated as $(60-51)/60 = 15\%$ lower than

English students when both are tested in English, while this was reduced to 10% (calculated by $(60-54)/60$) when Chinese students are tested in Chinese. Therefore the language contribution to the CT skill test is calculated as $(15-10)/15 = 33\%$. This outcome confirms the previous research of Paton (2005) that Chinese students' lack of CT is due more to English language deficiency and it is not sensible to conclude that it is purely the Chinese culture that leads to the problems with CT in Chinese students.

It should be acknowledged that the Chinese education system may also have an effect on Chinese students' CT skills. In the national university Entrance Examination, unified examination papers are implemented and scores are based on standard answers, making the basic education system become a kind of "exam-oriented education". This is similar to the UK where students are expected to have completed Advanced Level qualifications or equivalent. However, the education mode of junior and senior school in China is more teacher-centered, where students memorize the teaching content and are focused on testing. In this kind of indoctrination and cramming style of learning, students passively receive knowledge without using their own judgment, so it is difficult for the Chinese students to develop argument and assumption abilities, whereas teaching in the UK tends to be more student-centered.

It is also worth noting that the CC mean score for inference ability was higher than that of the English groups (59 % vs 51 %). This seems to correlate with Turner's (2006) conclusion that Chinese students have been frequently found to be good at mathematics and other scientific subjects which require reasoning. It is well known that Chinese students are well trained in reasoning and calculation during their primary and secondary education. As reasoning is a CT skill this result supports the idea that language proficiency could be a determining factor when it comes to perceived CT skills.

Comparing the ability of deduction between the two studied groups, the present results indicate that the average score of English students is similar to that of the Chinese students when the paper is completed in Chinese i.e. EE vs CC is 63% vs 62.5%; it could be argued that this is not surprising as according to the Chinese "New Curriculum Standard", which is the basic programme document of the national curriculum and the basic norm and quality requirement of the national curriculum for basic education in China, Chinese students have experienced mathematical activities such as observation, experiment, conjecture and proof; with the expectation of increasing their ability in deductive reasoning.

Our research results indicate that even when the language factor was excluded there is still a gap between English and Chinese students in certain aspects of CT

skills, and especially in the subsections 'Evaluation of Arguments' and 'Recognition of Assumptions'. The results of this research show that the CT skill scores for EE and CCon these two subsections are 72% vs 51% and 50% vs 41% respectively. It could be argued that these outcomes reflect differences in the cultural contexts. Independent judgment is encouraged in western countries. As a result, this contributes to an active process of thinking, where many different viewpoints need to be considered, which contrasts, with Chinese society, where traditional collectivistic values still exert potent influences (Watkins & Biggs, 1996). In this cultural context, higher values are placed on respect for authority, conformity and social harmony, while diversity in opinions may not be well appreciated. When issues arise, Chinese people are encouraged to judge and act with reference to the perceptions and feelings of others (Gabrenya & Hwang, 1996). This argument has also been echoed by Wan (2001), who claimed that respect for authority and desire for conformity may well affect Chinese students' learning styles and way of thinking. Thus, he believes that students are accordingly expected to respect teachers and listen quietly and carefully in class and so consequently they seldom question their teachers. These assertions also align with Hofstede's (1991) well-known theory of cultural theory- power distance. In high power distance cultures like some Asian countries, hierarchical and inequality is accepted. Therefore, cultural difference could also contribute to the disparity in CT skills.

Conclusions

The effect of language in the evaluation of CT ability has been revealed quantitatively for the first time by this research and this study indicates that language is an important factor when determining CT skills. It is understood this was a small study undertaken within a limited timescale. Ideally the full WGCTA Form Sappraisal form would have been used, or the reduced version piloted, but regardless of these limitations the study does highlight areas where Chinese students differ in CT ability to UK students. It can be seen that in some areas the Chinese students' CT skills are potentially stronger than, or equal to, UK students' skills which we believe can be explained by educational and possible cultural differences.

Reference

- Atkinson, D. (1997). A critical approach to critical thinking in TESOL. *TESOL Quarterly*, 31(1), 71–94.
- Bailin, S. (1995). Is critical thinking biased? Clarifications and implications, *Educational Theory*, 45(2), 191– 197.
- Brookfield, S. (1991). On ideology, pillage, language and risk: Critical thinking and the tensions of critical practice, *Studies in Continuing Education*, 13(1), 1– 14.
- California Critical Thinking Skills Test 2000 test manual*. (2008). Millbrae, CA: Insight Assessment.
- Canagarajah, A.S. (2002). *Critical academic writing and multilingual students*. Ann Arbor, MI: University of Michigan Press.
- Clark, R., & Gieve, S.N. (2006). On the discursive construction of ‘the Chinese learner’. *Language Culture and Curriculum*, 19(1), 54–73.
- Dong, T., Anderson, R.C., Kim, I., & Li, Y. (2008). Collaborative reasoning in China and Korea. *Reading Research Quarterly*, 43(4), 400–424.
- Dong, Y. (2015). Critical thinking education with Chinese characteristics. In M. Davies, & R. Barnett (Eds.), *The Palgrave Handbook of critical thinking in higher education* (pp. 351–368). New York: Springer.
- Facione, P.A., Facione, N.C., & Giancarlo, C.A. (2001). *California Critical Thinking Disposition Inventory: Inventory Manual* Millbrae, CA: California Academic Press, Fisher, A.. (2011). *Critical Thinking: An Introduction*. New York: Cambridge University Press.
- Fishman, A. (1988) *Amish literacy*. Portsmouth: Heinemann.
- Grosser, M.M. & Lombard, B.J.J. (2008). The relationship between culture and the development of critical thinking abilities of prospective teachers, *Teaching and Teacher Education*, 24(5), 1364–1375.
- Heng, T.T. (2016). Different is not deficient: Contradicting stereotypes of Chinese international students in US higher education. *Studies in Higher Education*, 43(1), 1–15.
- He, H., Zhang, Y.M., & Zhao, Y.Q. (2006). [A survey of critical thinking ability in college students]. *Chinese Nursing Research*, 20(3), 775–776.
- Hofstede, G.H. (1991) *Cultures and organizations: Software of the mind* New York: McGraw–Hill.
- Huang Yuanshen. (2010). The English Curriculum must be thoroughly reformed – on “Speculative Absence”. [J]. *Foreign Language World* (1), 11–16.
- McBride, R.E., Xiang, P., Wittenberg, D. & Shen, J. (2002). An analysis of preservice teachers’ dispositions toward critical thinking: A cross-cultural perspective, *Asia-Pacific Journal of Teacher Education*, 30(2), 131–140.
- McGuire, J.M. (2007). Why has the critical thinking movement not come to Korea? *Asia Pacific Education Review*, 8(2), 224–232.
- Norris, S.P. (1985). Synthesis of research on critical thinking. *Educational Leadership*. 42(8), 40–45.
- Paton, M. (2005). Is critical analysis foreign to Chinese students? In E. Manalo & G. Wong-

- Toi (Eds.), *Communication skills in university education: The international dimension* (pp. 1–11). Auckland: Pearson Education.
- Pennycook, A. (1996). Borrowing others' words: Text, ownership, memory, and plagiarism. *TESOL Quarterly*, 30(2), 201–230.
- Tan, C. (2017a) Thinking critically about liberal arts education: Yale–NUS College in Singapore. In: P. Marber & D. Araya (Eds) *The Evolution of Liberal Arts in the Global Age*. (pp.127– 140). New York: Routledge.
- Tan, C. (2017b). The enactment of the policy initiative for critical thinking in Singapore schools. *Journal of Education Policy*, 1–16.
- Turner, Y. (2006) Students from mainland China and critical thinking in postgraduate Business and Management degrees: Teasing out tensions of culture, style and substance, *International Journal of Management Education*, 5(1), 3–11.
- Wan, G. (2001). The learning experience of Chinese students in American universities: Across-cultural perspective. <https://eric.ed.gov/?id=ED439653>
- Watson, G.B., & Glaser, E.M. (1994). *Watson-Glaser critical thinking appraisal Form Manual*. San Antonio, TX: Harcourt Brace.
- Yudan, Yudan's understanding of Analects of Confucius. [M]Zhonghua Book Company Press 1st ed. Beijing, 2006.
- Yang, Y. (2016). Lessons learnt from contextualizing a UK teaching thinking program in a conventional Chinese classroom. *Thinking Skills and Creativity*, 19, 198–209.
- Zhu, X.L., Feng, W.H., & Yan, W.H. (2005). [Testing critical thinking ability among college nursing students]. *Chinese Nursing Research*, 20(1), 84–86.

Ifeoma P. Okafor
Nigeria

Fausta Manafa
Nigeria

Atinuke O. Adeniji
Nigeria

Issa Nasiru
Olokooba
Nigeria

Olumayowa
Ayorinde
Nigeria

Innovation and Employability of National Youth Service Corps Members for Sustainable Development in South-East, Nigeria

DOI: 10.15804/tner.2020.61.3.12

Abstract

This paper examines the innovation and employability of National Youth Service Corps (NYSC) members for sustainable development in south-east Nigeria. The research design employed for this study was a descriptive survey. The population for this study comprises all NYSC members serving in south-east Nigeria. A purposive sampling technique was used to sample all 2019 Batch “C” who participated in the Post Mobilisation Workshop held on 27th – 29th January 2020. Also, a simple random sampling technique was used to select 400 NYSC members from each state of south-east Nigeria. In all, 2000 NYSC members participated in this study. The questionnaire that was used to collect data in this study was titled “Influence of Innovation on Employability of NYSC Members for Sustainable Development Questionnaire”. Percentages were used in describing the demographic characteristics of the respondents, and mean ratings were used to answer the research questions. The findings revealed that influence of innovation on employability of NYSC members for sustainable development in south-east Nigeria was positive. The main new innovation to enhance employability of NYSC members for sustainable development in south-east Nigeria was agro-allied. The main employability skills of NYSC members for sustainable development in south-east Nigeria were confidence skills. It was concluded that innovation positively influences employability of NYSC members. It was recommended that the NYSC commission should embark on introducing more innovative skills to NYSC members for them to be able to stand on their own after the NYSC programme.

Key words: *Innovation, employability, NYSC member, sustainable development.*

Introduction

Poverty and unemployment are interrelated. An overabundance of contemporary societal challenges for producing adequate human capacity building and material utilisation are globally unfriendly to human social existence. Therefore, the Nigerian government aims to become one of the 20 most industrialised economies in the world by the year 2030 in its new Agenda.

Achievement of this ambition hinges on the extent to which the country can bring about innovation, and create and nurture a competitive and adaptive human resource base, responsive to the rapidly industrialising and globalising economy. This paper is mindful of the fact that the vision of Agenda 2030 designed by the United Nations is ten years away. The Agenda is a commitment to eradicate poverty and achieve sustainable development by 2030 worldwide, ensuring that no one is left behind. The adoption of the Agenda 2030 was a landmark achievement, providing for a shared global vision towards sustainable development for all. There is a lofty idea inherent in these programmes, but what is crystal clear is that poverty is still seriously ravaging the land. What becomes more worrisome is the teeming population of unemployed graduate youths in the country.

Currently Nigeria is facing a high rate of youth unemployment in society. To achieve or key into this Agenda 2030, the Nigeria government needs to train the teeming youth in innovation skills in order to reduce unemployment in the society. Innovation in its modern meaning is a new idea, meaning creative thoughts, and new imagination in the form of devices or methods. Innovation is often also viewed as the application of better solutions that meet new requirements, unarticulated needs, or existing market needs.

Higher education in Nigeria is responsible for the training of learners for the working population who have resourcefulness. Therefore, the main goals of higher education as stipulated by the National Policy of Education (FRN, 2013) are for students to obtain skills (physical and intellectual) which will facilitate their being autonomous and valuable members of society. However, Chukwurah and Atah (2017) reported that achievement of these goals is still distant with about 4.5 million youths ripe to enter the labour-force without hope of gainful employment due to a shortage of employable skills.

Yorke and Knight (2006) asserted that employability is a set of achievements, skills, understanding and personal attributes that make graduates more likely to gain employment and be successful in their chosen occupations. Toland (2011) wrote that employability skills are non-discipline specific, economically valuable skills required to get initial employment, progress in a job, as well as securing

another job when desired. Orji (2013) described employability skills as the professional competency sought after by employers by means of which students are helped to develop alongside the subject/discipline. In this study, employability refers to the set of skills, competency and attributes that increase the tertiary institution leaver's chances of obtaining initial worthwhile employment, maintaining and progressing in the profession, obtaining new employment if required, and being satisfied on the job. These skills include analytical and problem-solving skills, numeracy, confidence, time management, team working, communication skills, information technology, and monitoring skills.

Research efforts have been made towards unravelling the probable causes of the skyrocketing unemployment among fresh graduates in Nigeria despite the vast array of skills they should acquire in their training. Some of the factors responsible for these causes are godfatherism, fraud, and geometric increase in yearly graduate turnout, among others. A study carried out by Uchendu (2015) also revealed that higher education graduates in this 21st century appear to be lacking in employable skills some of which include the use of the computer, communication skills, ethical practice, teamwork, entrepreneurship, personal management, and leadership skills among others.

The graduates lack the capabilities to be self-employed or entrepreneurs which are needed in society. The lack of required skills has resulted in producing graduates who are more job seekers rather than job innovators (International Labour Organization, 2019). Therefore, one may assume that the goals of higher education, especially in south-east Nigeria, are far from being achieved. To this end, establishments are making efforts to ensure that graduates from various tertiary institutions are skill-oriented to facilitate individuals to be self-reliant rather than the over-dependent on white-collar jobs which is a primary culprit in the strain on available positions.

Chen, Wang, Nevo, Benitez-Amado and Kou (2015) opined that innovation and entrepreneurship education could promote improvement in youth employability. The primary way to improve the employability of the large numbers of youth in Nigeria is a process embarked on through the National Youth Service Corps (NYSC) with the fifth objective of the NYSC stated as being „to contribute to the accelerated growth of the national economy.” However, youths in Nigeria are now also realising that equipping themselves with technical knowledge is the surest way to remain not only globally relevant but to be creative like youths in developed countries. Secim (2017) reported that a supplementary analysis of the situation of industry should be done and guidance given to clarify the relationship between employment and an interests-based path of improvement, so as to maximise the

promotional role of innovation and entrepreneurship education in improving the employability of youths.

Adeoye (2015) asserted that Nigeria is a naturally endowed with entrepreneurship opportunities; however, the realisation of the full potential of these opportunities has been dampened by the adoption of inappropriate industrialisation policies at different times. Thaddeus (2012) averred that several policy interventions aimed at stimulating entrepreneurship development via promotion of small and medium scale enterprises, based on technology transfer strategy, have failed to achieve the desired goals. This failure has led to most indigenous entrepreneurs becoming distribution agents of imported products as opposed to building in-country entrepreneurial capacity for manufacturing, mechanised agriculture and expert services.

In other to enhance the employability of the Nigerian youths, there is a need to encourage the entrepreneurial among them. That is the reason why the Skills Acquisition and Entrepreneurship Development (SAED) programme was established in 2012 to coordinate efforts towards empowering NYSC members nationwide to become thriving entrepreneurs and value-adding employees after their service year. Through SAED the Federal Government of Nigeria introduced the vocational and entrepreneurship development programme to train corps members in construction, cosmetology, ICT, agro-allied services, film and photography, power and energy, automobiles, education, culture and tourism, among others.

Research is being conducted in the Nigerian perspective to evaluate, examine and explore the context of Nigeria experiences and views on employability trends of graduates of tertiary institutions. The justification of this study is premised on the decline in the employability of Nigeria graduates. In addition, there is no correlation between what studied in school and the situation in the labour market. Many industries have argued that graduates are not well trained to benefit national development and were inadequately trained and ill-equipped for work in industry (Brown, Nesse, Vinokur & Smith, 2003; Taiwo-Oguntuase, 2013).

However, there are various studies on innovation and skills acquisition among corps members in Nigeria, which include such investigations as; Adewusi and Adisa (2018) who researched skill acquisition and the entrepreneurship development programme among corps members in Ibadan, Nigeria. The study found that the participation of corps members in the Skill And Entrepreneurship Development (SAED) programme is affected by their place of primary assignment, instructors, career choice, and most notably, their egocentric reasoning that the SAED programme meant for certain categories of corps members.

Faloye and Olatunji (2018) worked on entrepreneurship education and self-employment intentions among fresh graduates in Nigeria. Entrepreneurship education, risk-taking, and the influence of family, friends, and mentors were found to be significant determinants of the entrepreneurial intentions of selected participants. The study concluded that establishing more skills acquisition and innovation centres across Nigeria will help to equip young graduates with the skills, knowledge, and attitudes required for them to be self-reliant. This development will, in turn, reduce graduate unemployment and criminal activity among Nigerian youths.

Aluko (2014) examined employers' perceptions of the employability skills of new graduates in Nigeria. A qualitative approach was adopted. 32 critical informants from Nigerian National bodies representing employers and Higher Education Institutions and 13 employers were interviewed in-depth. Findings revealed that employers expect graduates to have technical and discipline competencies from training received. They also require graduates to demonstrate a range of broader skills and attributes that include team-working, communication, leadership, critical thinking, innovativeness, problem solving and managerial abilities.

The study by Adelakun, Lawal, Oyegbami and Oyedokun (2019) was on the agro-allied aspect of the Skill And Entrepreneurship Development (SAED) programme of the NYSC programme in Oyo State, with focus on the personal characteristics of the corps members, attitude towards agro-allied activities and impending challenges. To further improve the position of graduate youths towards the agro-allied skill set of SAED, financial assistance, supervision, monitoring and psychological motivation should be advanced upon by all concerned stakeholders during as well as after the youth service programme. This goes a long way to encourage more graduate youths to take up agro-allied business as a profession. Engaging graduate youth in agriculture and retaining them in the sector is a strategy that could both contribute to increasing agricultural productivity and address youth unemployment.

Thomas and Eforuoku (2016) examined the determinants of participation in the Youth-In-Agriculture Programme (YIAP) in Ondo State, Nigeria. A multistage sampling procedure was used to draw a sample of 128 youths. Reports revealed inadequate training facilities as the most severe constraint to participation and participation in YIAP was above average (57.0%). Predictors significantly related to YIAP participation were household size, farm size, years of farming experience, attitude and constraints.

Iwayemi (2013) researched tackling unemployment challenges through coordinated sports and co-curricular programmes in Nigerian schools. Examined was the economic benefit of primary and secondary school co-curricular activities, with particular reference to games in tackling the unemployment challenges in Nigeria. Adebayo (2011) researched higher education and human capacity building in Nigeria. Ejiofor, Oni & Sejoro (2017) studied the assessment of educational and skill acquisition needs of internally displaced persons in Northern Nigeria. A purposive sample was used, with a researcher-designed instrument to elicit information from respondents. Findings of the study revealed that measures of the government in addressing the crisis of internally displaced persons in the country is on an ad-hoc basis with no reliable or sustainable solution in view. Also, the plight of internally displaced persons immensely hinders the developmental process of the region.

Problem of Research

This study has identified that the skill gap which exists based on the labour prerequisites of industries is based on input emanating from university educational management and output from the requirements of industry. Regrettably, this situation slows both economic and developmental growth among graduates. There is also a lack of communication between university education and industry, which this study intends to address.

Research Focus

This researcher investigated the innovation and employability of NYSC members and sustainability in south-east Nigeria. The study aims to provide answers to the following questions:

Research Questions

1. What is the influence of innovation on the employability of NYSC members for sustainable development in south-east Nigeria?
2. What are the innovations to enhance the employability of NYSC members for sustainable development in south-east Nigeria?
3. What are the employability skills of NYSC members for sustainable development in south-east Nigeria?

Methodology of Research

The research design employed for this study was a descriptive survey. The population for this study comprises all NYSC members serving in South-east Nigeria. A purposive sampling technique was used to sample all of the 2019 Batch “C” who participated in the Post-Mobilisation Workshop held on 27th – 29th January 2020. A simple random sampling technique was used to select 400 NYSC members from each state in south-east Nigeria. In all, 2000 NYSC members participated in this study. The questionnaire used to collect data was titled “Influence of Innovation on Employability of NYSC Members for Sustainable Development Questionnaire”. The questionnaire was in three sections. Section A dealt with the demographic characteristics of the respondent, such as gender, qualification and type of tertiary institution attended. Section B elicited information on innovations to enhance employability of NYSC members. Section C gathered information on the employability skills of NYSC members. The response pattern was based on a four-point Likert scale of Strongly Agree (SA = 4 points); Agree (A = 3 points); Disagree (D = 2 points), and Strongly Disagree (SD = 1 point). Percentages were used in describing the demographic characteristic of the respondents, and the mean rating to answer the research questions.

Results of Research

Research Question 1: *What is the influence of innovation on the employability of NYSC members for sustainable development in South-east, Nigeria?*

Participants’ responses on the influence of innovation on the employability of NYSC members for sustainable development questionnaire were collated. The minimum score, maximum score and range score of the respondents were 60, 15 and 45. The range was divided into two influence (positive and negative), and the cut off was 15. NYSC members with scores between 15–37.5 were regarded as having a negative impact, while NYSC members with scores between 37.6–60 were considered as having a positive influence, respectively, as presented in Table 1.

Table 1. Percentage Analysis of Influence of Innovation on Employability of NYSC Members for Sustainable Development in South-east, Nigeria

Influence of Innovation	Frequency	Percentage (%)
Positive	1502	75.1
Negative	498	24.9
Total	2000	100.0

Table 1 presents the responses of the participants to items that sought information on the influence of innovation on the employability of NYSC members for sustainable development in South-east Nigeria. The result in Table 1 indicated that 1502 (75.1%) of NYSC members believed that the influence of innovation on the employability of NYSC members for sustainable development in South-east, Nigeria, was positive. 498 (24.9%) of NYSC members believed that the influence of innovation on the employability of NYSC members for sustainable development in South-east, Nigeria was negative. This implies that the overall impact of innovation on the employability of NYSC members for sustainable development in South-east, Nigeria, was positive.

Research Question 2: *What are the innovations to enhance the employability of NYSC members for sustainable development in South-east, Nigeria?*

To answer this research question, participants' responses on the innovations to enhance the employability of NYSC members for sustainable development questionnaire were collected. The data collated from the sampled NYSC members were summed, as shown in Table 1.

Table 2. Mean Rating of New Innovations to Enhance Employability of NYSC Members for Sustainable Development in South-east, Nigeria

S/N	New Innovations to Enhance Employability of NYSC Members	Mean	Ranking
2	Agro-allied: education and training interested Corps members in the skills in processing and packaging of food	3.34	1st
10	Food processing/Preservation: organisations teach corps members involved in this about modern technologies, and ways to use them in food processing and preservation and how to do business out of it	3.29	2nd
3	Artists: at orientation camp artist come to teach Corps members preliminary phases of embellishing pictures, artworks and similar	3.29	2nd
6	Culture and tourism: Culture and tourism happen to be placing importance on the artworks, relics and attractive centres of a community that raise the interest of tourists	3.28	4th
1	Automobiles: organisations such as driving schools can be contacted within the state to help Corps members learn the skills of driving	3.27	5th
7	Education: organisations involved usually educate Corps members who have a passion for teaching, helping them in seeing various opportunities in the education sector and how to make a living from of it.	3.19	6th

S/N	New Innovations to Enhance Employability of NYSC Members	Mean	Ranking
12	Power & energy: organisations that can educate Corp members on specific ways to generate power and energy. The training includes training mostly how to build solar power systems	3.12	7th
8	Environment: teaching on the dangers facing the environment are highlighted, and practice in environmental ecology and economics is given, which is vital for most businesses today.	3.09	8th
9	Film and photography: organisations involved usually teach Corps members how to operate video cameras and cameras	3.08	9th
11	ICT: organisations that are ready to teach computer skills to students. Some of these skills would include skills on Microsoft office, web design, graphic design, program management and any other related skills	3.00	10th
5	Cosmetology: works hand in hand with experts involved in the care of hair and makeup as well as skincare and products	2.73	12th
4	Construction: Some of the training in this section might include bricklaying, the building of houses and roads, and similar	2.72	11th

Table 2 indicates that 2000 respondents participated in this study. The main innovation to enhance the employability of NYSC members for sustainable development in South-east Nigeria, was Agro-allied, which has a mean score of 3.34 (1st). Ranked second, with mean scores of 3.29, were food processing/preservation and decorative arts respectively. Culture and tourism have a mean score of 3.28 (4th). Next was automobiles with a mean score of 3.27 (5th), education which has a mean score of 3.19 was (6th), power and energy which has a mean score of 3.12 was ranked 7th. The environment was ranked 8th, with a mean score of 3.09 followed by film and photography with a mean score of 3.08 (9th) ICT was ranked 10th with a mean score of 3.00. Cosmetology had a mean score of 2.73 and was ranked 11th, while construction with a mean score of 2.72 was ranked 12th.

Research Question 3: *What are the employability skills of NYSC members for sustainable development in South-east, Nigeria?*

The data collated from the sampled NYSC members to answer the research question on participants' responses to the employability skills questionnaire were summed. The summary of the results is as shown in Table 3.

Table 3. Mean Rating of Employability Skills of NYSC Members for Sustainable Development in South-east, Nigeria

S/N	Employability Skills	Mean	Ranking
4	confidence skills	3.33	1st
8	information technology use skills	3.23	2nd
7	communication skills	3.21	3rd
2	problem-solving skills	3.19	4th
6	team working skills	3.18	5th
5	time management skills	3.17	6th
3	numeracy skills	3.11	7th
9	monitoring skills	2.93	8th
10	collaboration skills	2.86	9th
1	analytical skills	2.71	10th

Table 3 indicates that 2000 respondents participated in this study. The primary employability skills of NYSC members for sustainable development in South-east Nigeria, was confidence skills which have a mean score of 3.33 (1st). Information technology skills had a mean score of 3.23, communication skills: 3.21, problem-solving skills: 3.19, team working skills: 3.18, time management skills: 3.17, numeracy skills: 3.11, monitoring skills: 2.93, collaboration skills: 2.86 and analytical skills which had a mean score of 2.71 ranked 2nd to 10th respectively.

Discussion

The finding of this study revealed that the influence of innovation on employability of NYSC members for sustainable development in south-east Nigeria, was positive. This finding corroborates that of Thomas and Eforuoku (2016), who reported that youths have a favourable attitude towards skill acquisition and development of entrepreneurship. This disposition was due to innovations embedded in skill acquisition and development of entrepreneurship, which make them always explore new ideas that will enhance their livelihood activities and make them self-reliant instead of depending on white-collar jobs.

Another finding of this study revealed that the main innovation to enhance employability of NYSC members for sustainable development in south-east Nigeria, was Agro-allied. This finding suggests that respondents were aware of the

benefits of the programme, which yielded a favourable disposition towards the SAED programme. Adalakun et al. (2019) noted that despite the positive disposition recorded, the programme is still not fulfilling its stated objectives. By contrast, Ovwigho and Ifie (2009) carried out a study which revealed that the majority of youths had a negative attitude towards agricultural programmes.

Finally, the outcome of this study revealed that confidence skills were the primary employability skill of NYSC members for sustainable development in south-east Nigeria. This finding is in support of Aluko (2014) who reported that employers expect graduates to have technical and discipline competencies and required that they demonstrate a range of broader skills, among which are team-working, communication, leadership, critical thinking, innovativeness, problem-solving and managerial abilities.

Conclusions

It was concluded that innovation will positively enhance the employability of NYSC members and lead to the sustainable development of Nigeria society as a whole. It was therefore recommended that the NYSC commission should embark on introducing more innovative skills to NYSC members to enhance employability and entrepreneurial capabilities after the NYSC programme.

Acknowledgements

I hereby acknowledge the contributions of Dr. Jumoke I. Oladele for running grammar checks and plagiarism test, Miss. Amarachukwu L. Okafor and Mr. John-Frank Udennaka for setting the Manuscript.

References

- Adebayo, F.A. (2011). Higher educational and human capacity building in Nigeria. *Journal of Educational Review*, 4(4).
- Adalakun, O.J., Lawal, B.O., Oyegbami, A. & Oyedokun, M.O. (2019). Attitude of graduate youths towards Agro-allied skill acquisition and entrepreneurship development programme in Oyo State. *Journal of Agricultural Extension*, 23(1), 13–23.
- Adeoye, A. (2015). The effect of entrepreneurship on economy growth and development in Nigeria. *International Journal of Development and Economic Sustainability*, 3(2), 49–65.
- Adewusi, O.A. & Adisa, B.I. (2018). The skill acquisition and entrepreneurship develop-

- ment programme among corps members in Ibadan, Nigeria. *Zaria Sociological Journal*, 5(1), 248–260.
- Aluko, Y.A. (2014). Employers' perceptions of the employability skills of new graduates in Nigeria. *Journal of Educational Review*, 7(4), 547–556.
- Brown, S.L. Nesse, R.M., Vinokur, A.D. & Smith, D.M. (2003). Providing social support may be more beneficial than receiving it: Results from a prospective study of mortality. *Psychological Science*, 14(4), 320–327.
- Brundtland Commission (1987). *Report of the World Commission on Environment and Development*. United Nations.
- Chen, Y., Wang, Y., Nevo, S., Benitez-Amado, J., & Kou, G. (2015). IT capabilities and product innovation performance: The roles of corporate entrepreneurship and competitive intensity. *Information & Management*, 52(6), 643–657.
- Chukwurah, C.C. & Atah, C.A. (2017). Rebranding entrepreneurship education in tertiary institutions for national economic development. *A paper presented at Association of Business Educators of Nigeria (ABEN). ABEN 29th Annual National Conference Plateau, Jos.*
- Faloye, D.O. & Olatunji, O.D. (2018). Entrepreneurship education and self-employment intentions among fresh graduates in Nigeria. *Journal of Economics and Sustainable Development*, 9(12), 146–158.
- Federal Republic of Nigeria (FRN, 2013). *National policy on education*. Abuja: NERDC
- Orji N S (2013). Assessment of employability skills development opportunities for senior secondary school chemistry students. *Journal of Educational Research and Reviews*, 1(2), 16–26.
- Ovwigbo, B.O. and Ife, P.A. (2009). Attitude of youth towards Agricultural development programmes in Ughelli South Local Government Area of Delta State, Nigeria. *Journal of Agricultural Extension*, 13(2), 67–69.
- Secim, G., A. (2017). Study on substance abuse prevention. *Eurasia Journal of Mathematics Science and Technology Education*, 13(6), 2485–2504.
- Taiwo-Oguntuase, S. (2013). Unemployability of Nigerian graduates – myth or reality. Article in *Daily Independent Newspaper*, 2nd October 2013. sourced from <http://dailyindependentnig.com>
- Thaddeus, E. (2012). Perspectives: Entrepreneurship development & growth of enterprises in Nigeria. *Entrepreneurial Practice Review*, 2(2), 31–35.
- Thomas, K.A. & Eforuoku, F. (2016). Determinant of participation in youth-in-Agriculture programme in Ondo State, Nigeria. *Journal of Agricultural Extension*, 20(2), 104–117.
- Toland, A. (2011). *STEM employability skills review*. The National HE STEM Programme, University of Birmingham, Edgbaston, Birmingham.
- Uchendu, C.C. (2015). Assessing university students' skill acquisition for employability in Cross River State. *International Journal of Education, Learning and Development*, 4(1), 45–51.
- Yorke M. & Knight, P. (2006). *Embedding employability into the curriculum*. New York: Higher Education Academy.

Exploring the Moral Competencies of Gifted Students: Validation of Moral Competency Inventory – MCI

DOI: 10.15804/tner.2020.61.3.13

Abstract

Starting from the modern understanding of giftedness as a domain-specific personality quality, research was conducted to determine the moral competencies of gifted students in different domains and to examine the psychometric characteristics of the adapted version of Moral Competency Inventory – MCI on a sample of 473 respondents. The results indicate that the original four-factor structure has been confirmed and that the MCI is a reliable and valid instrument suitable for application in other educational contexts as well. It was found that students gifted in different domains differ from each other when it comes to integrity and that this property is most developed in students gifted in the field of sports, then music, mathematics, and finally, visual arts. Such results indicate the importance and need for continuous professional guidance and intentional moral education of gifted students.

Key words: *domains of giftedness, moral competencies, MCI, factor analysis, Serbia.*

Introduction

An important aspect of the research on the phenomenon of giftedness is the attempt to determine the personal characteristics that accompany the emergence of excellence, where the attention of researchers is drawn to the question of the

moral competence of gifted persons. The beginnings of research on this issue can be found in traditional studies of giftedness: participants in Terman's study (so-called "termites") showed significant progress in the measures of "*trustworthiness and moral stability*" (Terman, 1925). A study conducted somewhat later found a strong interest in ethical and moral issues in a sample of extremely gifted respondents (IQ > 180) (Hollingworth, 1942). Recent studies indicate that gifted children have an early and intense preoccupation with moral issues (Lovecky, 1997; Tolan, 1998; Winner, 1996). The moral competence of gifted children mostly goes beyond mere consideration of ethical issues and usually entails adequate moral behavior. According to the Lovecky (1997), many gifted children very early show compassion and a desire to alleviate other people's suffering, as well as the ability to take a firm moral stance and behave in accordance with a certain principle. Due to the need for logical consistency, gifted children are passionately committed to the truth and loathe their own and other people's inconsistencies (Silverman, 1998).

It is important to note that morality has a two-way connection with giftedness – the first refers to cultural morality, which implies everyday social expectations, while the second concerns the personal morality of the gifted themselves (Freeman, 2008). Since gifted children show the potential to become morally responsible early on (Roeper & Silverman, 2009), moral sensitivity is central to the experience of the gifted children (Tirri, 2010), and is associated with high intelligence and abstract thinking (Silverman, 1994). In addition, in papers that explore the connection between morality and academic success, morality is most often conceptualized through the term "character" and operationalized through examining the dimensions of honesty, empathy, fairness, altruism, idealism, and such (Berkowitz & Hoppe, 2009). Schools that have introduced "character education" programs into their curricula or incorporated certain essential ethical values, have shown better results on standardized academic achievement tests (Benninga, Berkowitz, Kuehn, & Smith, 2003; Snyder et al., 2009).

Moral competencies of gifted students

Insight into the relevant literature suggests that distinctive features of the gifted in the domain of morality were often determined in relation to the average population. The description of the moral side of a person depending on the specific domain of the manifestation of giftedness is significantly less often encountered. Namely, giftedness manifested in a certain domain does not have a general intellectual ability that is simply directed towards that domain for a substrate, but has its origin in highly developed specific abilities that correspond to a given domain or base of certain knowledge (Pekić, 2010). Given the fact that domains differ in

the content and structure of the knowledge they encompass, it is reasonable to assume that the relationship between abilities and domains is two-way – while specific abilities direct the individual to a particular domain, the domain directs the further development of these specific abilities by making specific demands on the individual (Letić, Milutinović, & Grandić, 2016). In addition, the domain-specific quality of giftedness is not only reflected in the development of certain types of abilities, but the prevailing understanding emphasizes the fact that talents manifested in different domains also imply different combinations of personal characteristics (Benbow & Minor, 1990). Accordingly, the research presented in this paper aims to examine differences in moral competencies in the context of different domains of giftedness, and to complement this with empirical data.

The study *Moral Intelligence 2.0* (Lennick & Kiel, 2011) is important for the conceptual definition and theoretical foundation of the issues that are the basis of this research. Lennick and Kiel describe the moral person in terms of four competencies – *integrity*, *responsibility*, *compassion* and *forgiveness* – defining them as relatively stable character traits that allow an individual to act in accordance with moral principles and moral understandings of society. It is important to note that the authors speak of these competencies as dynamic categories which have their place in explaining the process of achieving success, since they represent a framework that defines the desirability of goals and the means of achieving them and, in this sense, they give direction to and determine the content of activities (Lennick & Kiel, 2011).

According to Lennick and Kiel, *Integrity* is the trademark of a moral person. When acting with integrity, a person does what they know is good; they act in accordance with their principles, values and beliefs, speak the truth, stand for what is right and fulfill their promises. *Responsibility* is another important competence of a moral person. A person that is willing to take responsibility for their personal choices, to admit their mistakes, and to serve others can be considered moral. *Compassion* is significant, because by caring for others, a person not only conveys their respect of others, but also creates a climate in which others will be compassionate towards them when it is most needed. *Forgiveness* refers to tolerance of mistakes and knowledge of their own imperfections, without which a person would be rigid and inflexible towards themselves and others. Forgiveness works on two levels: the first is how a person treats themselves, and the second is how they treat others (Lennick & Kiel, 2011). Based on these theoretical assumptions and understanding of moral competence, Lennick and Kiel created a scale for the purpose of examining moral competencies whose psychometric characteristics were examined and are presented in this research.

Methodology of Research

General Background of Research

The aim of this paper was to examine the factorial structure of the Serbian version of the Moral Competency Inventory (MCI), assuming that, as in the original study, the four-factor structure of the scale would be confirmed. Additionally, reliability and validity of the MCI scale when applied in a sample of gifted students in Serbia were examined. The second goal of the paper was to determine distinctive features in the moral competencies of gifted students in the fields of music, visual arts, sports and mathematics, that is, in the area of the following moral competencies: integrity, responsibility, compassion and forgiveness. The assumption was that the results would indicate different constellations of moral competencies, depending on the type of domain with which the individual interacts.

Sample of Research

Theoretical concepts and empirical findings suggest that giftedness is most justifiably operationalized through high achievement on tests of specific abilities (Gagné, 1997), which is why the research included students of specialized high schools for the gifted; this is due to the fact that entrance exams for these schools include tests of specific abilities. The research was conducted in 10 schools for gifted students in Serbia on a sample of 473 respondents from Novi Sad, Belgrade and Kraljevo, namely: students gifted in the field of music (N = 102), the visual arts (N = 96), sports (N = 152) and mathematics (N = 123). The sample was suitable and gender-balanced (206 boys and 267 girls), and included students from all four grades.

Instrument and Procedures

To assess moral competencies, an adapted version of the *Moral Competency Inventory – MCI*, by Lennick and Kiel (2011) was used. The instrument included 40 statements in the form of a five-point Likert-type scale (from 1 – strongly disagree, to 5 – strongly agree) which were arranged in four subscales. Participation in the research was voluntary and anonymous, and respondents filled out questionnaires at their school during one school class. Respondents were introduced to the purpose of the research and instructions given for filling out the questionnaire.

Results and Discussion

Factor analysis of the applied instrument

In order to examine the measurement of the IMC, factor analysis (principal component analysis) was applied. The validation of the application of factor analysis was performed through Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity. The obtained KMO value is .852, while the value of Bartlett's Test of Sphericity is statistically significant ($p < .001$), which indicates the suitability of the correlation matrix for factor analysis. After the elimination of items with a loadings below .30, 32 items were retained. Although the Guttman-Kaiser root one criterion suggested the isolation of as many as 13 factors, based on a scree-plot, a four-factor solution was retained. The isolated four factors explain 32.41% of the total variance of the input set of variables (Table 1). Cronbach's alpha is .83, which indicates high internal consistency of the instrument.

Table 1. Values of characteristic roots and percentage of explained variance of isolated factors

Factor	Initial values			Values after rotation
	λ	% of variants	Cumulative %	λ
1	8.71	17.43	17.43	6.35
2	3.22	6.44	23.87	5.88
3	2.34	4.68	28.55	5.50
4	1.93	3.87	32.41	4.30

The set of isolated *promax* factors with the intensity of saturation of individual items on the scale is shown in Table 2.

Table 2. Matrix of the set of isolated factors

Items	Factor			
	1	2	3	4
I can clearly state the principles, values and beliefs that guide my actions	.463			
When someone asks me to keep a confidence, I do so	.637			
When faced with an important decision, I consciously assess whether the decision I wish to make is aligned with my most deeply held principles, values and beliefs	.411			

Items	Factor			
	1	2	3	4
My friends know they can depend on me to keep my word	.568			
My friends think of me as an honest person	.500			
My friends would say that I take ownership of my decisions	.638			
My friends would say that I stand up for my convictions	.610			
My friends would say that my behavior is very consistent with my beliefs and values	.541			
When I agree to do something, I always follow through	.665			
My friends know they can depend on me to be truthful to them	.635			
It is not very important for me to keep my word	-.582			
When a situation may prevent me from keeping a promise, I consult with those involved to renegotiate the agreement	.542			
When I make a decision that turns out to be a mistake, I admit it	.639			
It is problem for me to admit my own mistakes and failures	-.480			
When I make a mistake, I take responsibility for correcting the situation	.666			
When things go wrong, I do not blame others or circumstances	.604			
My friends would say that I do not have a realistic attitude about my mistakes and failures	-.480			
I am willing to accept the consequences of my mistakes	.640			
I am willing to admit my mistakes and failures.	.680			
My friends would say that I go out of my way to help them			.599	
It is satisfying for me to help others			.670	
I truly care about the people around me			.720	
I do not pay attention to the needs of others			-.541	
I spend a significant amount of time providing resources and removing obstacles for my friends			.606	
Because I care about my friends, I actively support their efforts to achieve important personal goals			.636	
If I am able to, I would never refuse to help others			.607	
I am able to „forgive and forget,” even when someone has made a serious mistake				.590
When I forgive someone, I find that it benefits me as much as it does them				.602
Even when I have made a serious mistake in my life, I am able to forgive myself and move ahead				.504
Even when people make mistakes, I continue to trust them				.542
I resist the urge to dwell on my mistakes				.511
I accept that other people will make mistakes				.613

The first factor is defined by items that clearly indicate the tendency of a person to act in accordance with their own principles and beliefs, to tell the truth, stand up for what is right and fulfill promises, and it is called *integrity* ($\alpha = .79$). The second factor is called *accountability* ($\alpha = .74$), as most of these items relate to the tendency to take responsibility for personal choices and to admit mistakes and omissions. The items that define the third extracted factor indicate active care for others and support of the decisions of others, and this factor is called *compassion* ($\alpha = .77$). The fourth factor brings together items that indicate a person's willingness to forgive their own and other people's mistakes; this factor is called *forgiveness* ($\alpha = .70$). In this study, the factor structure obtained by the authors of the scale was confirmed (Lennick & Kiel, 2011). Also, good reliability of all subscales was found, even higher in relation to the results of another study in which the reliability coefficients (α) ranged from .66 for the responsibility scale to .72 for the integrity scale (Martin & Austin 2010).

The inter-correlations of the extracted factors are low to moderate and positive (Table 3), indicating the coherence of the measurement of the reduced IMC. The highest correlation coefficient was achieved between the factors of integrity and responsibility, as well as between the factors of compassion and forgiveness.

Table 3. Inter-correlations of extracted factors

	Integrity	Responsibility	Compassion
Integrity	-		
Responsibility	.462	-	
Compassion	.286	.281	-
Forgiveness	.143	.206	.420

Differences in the development of moral competencies with regard to the domain of giftedness

Within the second research goal, the existence and difference in the structure of competences between students gifted in the fields of music, visual arts, sports and mathematics was examined in the context of separate moral competencies: integrity, responsibility, compassion and forgiveness. In the realization of such a specified research goal, multivariate analysis of variance was applied and the results of testing the significance of differences in the moral competencies are shown in Table 4.

The results indicate that students gifted in four different domains significantly differ in the linear combination of the dependent variables. Such a result indicates

Table 4. Multivariate tests of significance of differences

Multivariate tests	Value	F	p
Pillai's Trace	.052	2.078	.016
Wilks' Lambda	.948	2.082	.016
Hotelling's Trace	.054	2.084	.015
Roy's Largest Root	.036	4.237(b)	.002

the validity of further research on the differences between the examined groups on each individual dependent variable. The significance of differences between groups in terms of moral competencies is shown in Table 5.

Table 5. Significance of differences between groups on individual dependent variables

Dependent variables	Domain of giftedness	AS	SD	df	F	p
Integrity	Music	.165	.834	3	5.024	.002
	Visual arts	-.208	1.010			
	Sports	.195	.908			
	Mathematics	-.069	.911			
Responsibility	Music	.130	.918	3	.779	.506
	Visual arts	-.073	1.014			
	Sports	.005	.994			
	Mathematics	-.015	.970			
Compassion	Music	.162	1.022	3	.922	.430
	Visual arts	-.033	.895			
	Sports	.033	.788			
	Mathematics	-.025	1.124			
Forgiveness	Music	.044	.923	3	1.540	.203
	Visual arts	.109	.983			
	Sports	.117	.913			
	Mathematics	-.110	.979			

Based on the significance of the F test, it is possible to conclude that students gifted in different domains differ in the Integrity factor ($p = 0.002$), and the mean values suggest that this property is most developed in students gifted in sports,

music, then mathematics and last, visual arts. In order to precisely determine differences that exist between the different groups and which groups these are (since the independent variable has four levels), a one-factor analysis of variance, i.e. Scheffe's test for multiple comparisons between groups, was performed (Table 6).

Table 6. Scheffe's test for multiple comparisons between groups

(I) Domain of giftedness	(J) Domain of giftedness	Difference between arithmetic means I-J	P
Music	Visual arts	.373(*)	.043
	Sports	-.029	.996
	Mathematics	.233	.304
Visual arts	Music	-.373(*)	.043
	Sports	-.403(*)	.010
	Mathematics	-.139	.740
Sports	Music	.029	.996
	Visual arts	.403(*)	.010
	Mathematics	.263	.132
Mathematics	Music	-.233	.304
	Visual arts	.139	.740
	Sports	-.263	.132

Scheffe's test clearly indicates the existence of statistically significant differences in terms of integrity between artistically gifted, on the one hand, and musically and athletically gifted students, on the other. This competence is best explained by the following items: "when I agree to do something, I always follow through"; "My friends would say that I take ownership for my decisions"; "My friends know they can depend on me to be truthful to them"; "My friends know they can depend on me to keep my word". Based on these findings, it can be concluded that students gifted in the fields of music and sports are characterized by a greater need to do good deeds, to behave in accordance with their own principles and beliefs, to tell the truth, to advocate for what is right, and to keep promises given, compared to their artistically gifted peers. Such results, at the same time, show the absence of statistically significant differences concerning responsibility, compassion and forgiveness between the examined groups, meaning the initial assumption is only partially confirmed in the results obtained.

Such findings point to the high structure of the domain of sports and music, which implies the existence of explicit “rules” that need to be followed, which is probably reflected in the willingness and capacity of athletes and musicians to “play by the rules” in everyday life, to adhere to ethical principles and suggests that they are guided by a sense of duty. Features of unconventionality (Csikszentmihalyi, Rathunde & Whalen, 1993) and non-conformism (Feist, 1999) are more inherent in the domain of painting, and it can be said that it requires a slightly different “world view” than one resulting from conforming with established norms and values. In this regard, previous studies have shown that artistically gifted students show greater barriers in terms of social adjustment, most likely because society, and consequently the school system, value giftedness in this domain less (Olenchak, 1999), which is probably negatively reflected on their integrity. Finally, a possible explanation for the absence of statistically significant differences between the examined groups concerning responsibility, compassion and forgiveness could be that the mentioned moral competencies proved important for all four domains of giftedness.

When it comes to the limitations of this research, the question arises whether choosing another instrument would show a different structure of moral competencies in students gifted in different domains. Another possible limitation lies in possible subjectivity of the self-assessment of the respondents; the inclusion of assessment by others would complement the data on the researched phenomenon.

Conclusions

This study provided additional empirical confirmation for the use of MCI on a sample of gifted students in Serbia. The four-factor structure of the questionnaire was confirmed as in the original research (Lennick & Kiel, 2011), and good reliability and validity of the instrument were determined, all of which could enable comparison of results obtained in the educational context of Serbia with results in other countries. Additionally, the results indicate domain-specific differences when it comes to the moral quality of *integrity* in gifted students. Such results are consistent with previous research which found that gifted people are characterized by compassion, a desire to alleviate other people’s suffering, and a strong moral attitude (Lovecky, 1997), and that they are passionately committed to truth and consistency (Silverman, 1998).

These results indicate the need for continuous pedagogical guidance of gifted students through the integration of moral education into the educational pro-

cess. In this sense, adequate professional preparation and education of teachers for teaching and supporting gifted students is especially important. The results obtained also have practical implications, since the validated and abbreviated version of MCI can be used to examine the moral competencies of all students and will further direct educational work towards their advancement and development, which can lead to greater academic success (Elias, White, & Stepney, 2014).

Acknowledgements

The paper is a result of the work on the Project “Quality of the Education System of Serbia in the European Perspective”, financed by the Ministry of Education, Science and Technological Development of the Republic of Serbia. The research was conducted as a part of the doctoral dissertation “Importance of moral and leadership characteristics for the achievement of giftedness”, which was defended at the Faculty of Philosophy, University of Novi Sad.

References

- Benbow, C.P., & Minor, L.L. (1990). Cognitive profiles of verbally and mathematically precocious students: Implications for identification of the gifted. *Gifted Child Quarterly*, 34(1), 21–26.
- Benninga, J.S., Berkowitz, M.W., Kuehn, P., & Smith, K. (2003). The relationship of character education implementation and academic achievement in elementary schools. *Journal of Research in Character Education*, 1(1), 19–32.
- Berkowitz, M.W., & Hoppe, M.A. (2009). Character education and gifted children. *High Ability Studies*, 20(2), 131–142.
- Csikszentmihalyi, M., Rathunde, K., & Whalen, S. (1993). *Talented teenagers: The roots of success and failure*. New York: Cambridge University Press.
- Elias, M.J., White, G., & Stepney, C. (2014). Surmounting the challenges of improving academic performance: Closing the achievement gap through social emotional and character development. *Journal of Urban Learning, Teaching, and Research*, 10, 14–24.
- Feist, G.J. (1999). Personality in scientific and artistic creativity. In R.J. Sternberg (Ed.), *Handbook of creativity* (pp. 273–296). Cambridge: Cambridge University Press.
- Freeman, J. (2008). Morality and giftedness. In T. Balchin, B. Hymer, & D. Mathews (Eds.), *The Routledge International Companion to Gifted Education* (pp. 141–148). London and New York: Routledge.
- Gagné, F. (1997). Critique of Morelock’s (1996) definitions of giftedness and talent. *Roeper Review*, 20(2), 76–85.
- Hollingworth, L.S. (1942). *Children above 180 IQ Stanford-Binet: Origin and development*. New York: World Book.

- Lennick, D., & Kiel, F. (2011). *Moral intelligence 2.0: Enhancing Business Performance and Leadership Success in Turbulent Times*. Boston: Pearson Education.
- Letić, M., Milutinović, J., & Grandić, R. (2016). Personality Traits and Domen-Specific Quality of Giftedness. *Didactica Slovenica*, 31(3–4), 21–37.
- Lovecky, D.V. (1997). Identity development in gifted children: Moral sensitivity. *Roeper Review*, 20(2), 90–94.
- Martin, E.D., & Austin, B. (2010). Validation of the moral competency inventory measurement instrument: Content, construct, convergent and discriminant approaches. *Management Research Review*, 33(5), 437–451.
- Olenchak, F.R. (1999). Affective development of gifted students with nontraditional talents. *Roeper Review*, 21(4), 293–297.
- Pekić, J. (2010). Uloga domena u nastanku specifičnog kvaliteta darovitosti [Importance of a domain role in creation of a specific quality of the gifted]. *Godišnjak Filozofskog fakulteta u Novom Sadu [Annual Review of the Faculty of Philosophy]*, 35(1), 193–205.
- Roeper, A., & Silverman, L.K. (2009). Giftedness and Moral Promise. In D. Ambrose & T. Cross (Eds.), *Morality, Ethics, and Gifted Minds* (pp. 251–264). New York: Springer Science+Business Media LLC.
- Silverman, L.K. (1994). The moral sensitivity of gifted children and the evolution of society. *Roeper Review*, 17(2), 110–116.
- Silverman, L.K. (1998). Through the lens of giftedness. *Roeper Review*, 20(3), 204–210.
- Snyder, F., Flay, B., Vuchinich, S., Acock, A., Washburn, I., Beets, M., & Li, K.K. (2009). Impact of a social-emotional and character development program on school-level indicators of academic achievement, absenteeism, and disciplinary outcomes: A matched-pair, cluster-randomized, controlled trial. *Journal of Research on Educational Effectiveness*, 3(1), 26–55.
- Terman, L.M. (1925). *Genetic studies of genius: Volume 1*. Palo Alto, CA: Stanford University Press.
- Tirri, K. (2010). Combining excellence and ethics: Implications for moral education for the gifted. *Roeper Review*, 33(1), 59–64.
- Tolan, S.S. (1998). The Lemming Condition: Moral asynchrony and the isolated self. *Roeper Review*, 20(3), 211–214.
- Winner, E. (1996). *Gifted children: Myths and realities*. New York: Basic Books.

Living Values-Based Authentic Assessment in Civic Education in Fostering Student Character

DOI: 10.15804/tner.2020.61.3.14

Abstract

This study seeks to delineate a living values-based authentic assessment model in civic education to foster student character. A research and development design was adopted, with the subjects being high school students in Bandung City and West Bandung Regency, Indonesia. Conceptually, a living values-based authentic assessment is one that amalgamates living values and living values education principles into civic education learning assessments by taking into account the principles of authentic assessment, the core and basic competencies in the curriculum, the main characteristics in the educational program for strengthening character, principles for writing questions based on higher-order thinking skills, and principles for preparing assessments. The types of authentic assessment developed herein are attitude assessment and self-assessment. Based on the results of the validation of experts and practitioners, it is found that the majority (82.84%) rated the authentic assessment instruments as good.

Keywords: *authentic assessment, character, civic education, living values, students*

Introduction

The increasingly open use of internet media without limits of space, time, and national territory in the Industrial Revolution Era 4.0 has brought about the problem of disorientation as regards “the Five Principles,” the *Pancasila* values

which are the ideology of the Indonesian state, shifting ethical values in the life of the nation and state, causing waning awareness of national cultural values, the threat of national disintegration, and the weakening of national independence (Komalasari & Saripudin, 2018).

These problems lead to the weakening of the nation's character among Indonesia's young generation. Therefore, it is necessary to optimize the nation's character education in schooling through Communities of Character. Character education is integrated in learning in all subjects, especially Civic Education which is the subject that upholds the mission to educate young people in the life of the Indonesian nation through the provision of „value-based education” and the means of nation and character building (Komalasari & Sapriya, 2016; Komalasari & Saripudin, 2017)

Among the important components of civic education is assessment because it serves as a benchmark for the attainment of learning objectives. Assessment should be authentic, for it comprehensively assesses the learning inputs, processes and outputs which cover the target attitudes, knowledge, and skills. Authentic assessment assesses the readiness of students, as well as the whole process and learning outcomes. The integration of the three components (input – process – output) into the assessment will better reflect the capacity, style, and learning outcomes of students, and even have impact on instruction learning. Authentic assessment emphasizes the students' need to learn and then underscores their ability to apply knowledge and skills in the real world, or authentic context (Mueller, 2011). The assessment process must be carried out in an integrated manner throughout the learning process so that the results of the assessment can show actual student progress or learning achievements as a whole (Stiggins, 2006). Among the types of authentic assessment in learning are performance appraisal, self-assessment, essay, portfolio, and project appraisal (Bourke & Mentis, 2013).

In reality, however, teachers generally only use paper and pencil tests, so student character development is rather overlooked (Uno & Satria, 2014). For this reason, it is a matter of necessity to reconstruct an authentic learning assessment system that embraces the following characteristics: 1) it is comprehensive, contextual, and enhances higher-order thinking skills (Rohayani, et al., 2018); 2) it is based on living values originating from the *Pancasila* values and national culture (Tillman, 2004; Komalasari & Saripudin, 2017); 3) it is based on the school culture (Saripudin & Komalasari, 2015); and 4) it is based on the values that highlight moral knowing, moral feeling, and moral action as a whole and can be developed over time (Lickona, 2013).

All of these characteristics must be integrated into the assessment in civic education through a living values-based authentic assessment model to hone student characters in terms of religiosity, cooperation, responsibility, integrity, and independence. Therefore, it is of importance to propose an authentic assessment model based on living values in civic education to meet this end.

Problem of Research

The research problem is formulated as follows:

- a. What is the conceptual model of living values-based authentic assessment in civic education to foster student character?
- b. What is the initial product of the model?
- c. What are the results of the validation of the initial product?

Methodology of Research

General Background of Research

The research was conducted with the use of Borg and Gall's (2003) Research and Development design to produce a living values-based authentic assessment model in civic education to develop student character. An exploratory method was utilized to generate a conceptual model and a quantitative descriptive method was used to validate the model.

Sample of Research

The project took place in Bandung City and West Bandung Regency High Schools, West Java, Indonesia with the research subjects being students of state senior high schools (henceforth SMAN) 2 Bandung, SMAN 3 Bandung, SMAN 15 Bandung, SMAN 1 Lembang, and SMAN 1 Padalarang with a total of 175 students, and 10 teachers.

Instrument and Procedures

Data collection techniques included: (1) observation; (2) documentation study; (3) focus group discussion; and (4) questionnaire. The research procedure utilized step 1 to 4 of the 10 steps of Borg and Gall's framework namely: Gathering information, Planning, Developing a preliminary form of product, and Preliminary field testing.

Data Analysis

Qualitative data analysis was conducted to generate a conceptual model and an initial product whose steps encompass: (1) conducting data reduction; (2) arranging data systematically based on certain categories and classifications; (3) making a data display in the form of tables or figures; (4) conducting a cross-site analysis; and (5) presenting findings, drawing conclusions in the form of general trends and the implications of their application, and proposing recommendations for development (Fraenkel & Wallen, 2008). Meanwhile, quantitative analysis was conducted to quantify the questionnaire results using a quantitative descriptive method (Creswell, 2012) to discover the results of the validation of the experts and practitioners to the initial product.

Results of Research

The Concept of Living Values-Based Authentic Assessment Models in Civic Education

Preliminary observations on the implementation of the assessments in schools and interviews with the teachers and experts concerning the analysis of the need to develop an authentic assessment model reveal that conceptually an ideal assessment model should embed living values and the principles of living values education by taking into account the principles of authentic assessment, and the core competencies and basic competencies prescribed in the curriculum. It should

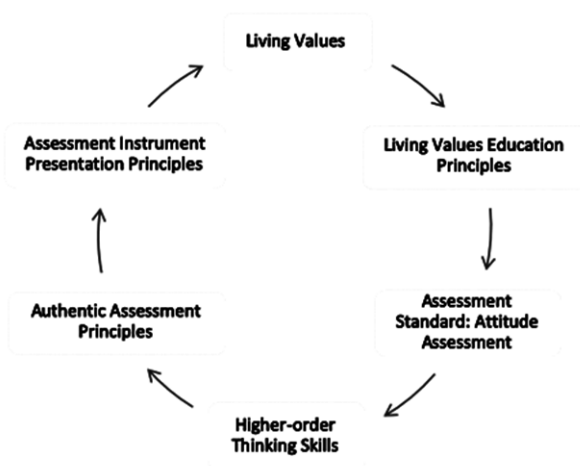


Figure 1. The components of living values-based authentic assessment

adhere to the principles of preparing questions based on higher-order thinking skills, and the principles of preparing assessments.

Based on Figure 1, the following are the principles for developing authentic assessment:

- a. Developing the values of life by considering: a) the main characteristics under the demand in the Character-Building Strengthening Program (religiosity, integrity, nationalism, independence, and responsibility); b) the vision and mission of the school; c) demands of the core competencies and basic competencies related to religious and social attitudes.
- b. Developing the principles of living values education which include identifying and developing points for reflection, which include broad imagination, relaxation and focus, artistic creations, social skills, cognitive awareness about justice, social harmony, and cultural values.
- c. Applying the Assessment Standards according to the Regulation of the Minister of Education and Culture No. 23 year 2016, especially in relation to value-based assessment. Attitude assessment involves an educational measure to obtain descriptive information about student behavior, which can be done through observation, self-assessment, peer-assessment and other relevant assessment techniques.
- d. Assessment is directed at developing higher order thinking and conflict resolution skills. The development of higher-order thinking skills (HOTS) calls for a range of criteria in terms of the construct and content.
- e. Applying the following assessment principles: The assessment should be: 1) valid; 2) objective; 3) fair; 4) integrated; 5) transparent; 6) comprehensive and sustainable; 7) systematic; 8) criteria-based; and 9) accountable
- f. Applying the principles when presenting the assessment instruments
 - 1) *Content*: assuring compatibility with the core competencies and basic competencies in the curriculum: shaping student knowledge, skills and attitudes that they must possess to facilitate their social participation in life.
 - 2) *Construct*: the presentation of questions should meet certain criteria for item description and multiple-choice items.
 - 3) *Language and readability*: a) sentences conform to good and correct Indonesian language rules; b) sentences should exhibit logical and systematic thinking patterns; c) the structure of sentences aligns with the level of students' language mastery; and d) sentences are communicative in their use.

A Preliminary Model of Living Values-based Authentic Assessment in Civic Learning

The model under investigation was constructed using two forms of assessment, self- and peer-assessment:

- a. Self-assessment is a technique of assessing oneself by identifying one's attitude and behavioral patterns when dealing with a situation. The self-assessment developed herein was tailored taking into account higher-order thinking skills, context (based on real-life), case, and conflict resolution. It is according to the material for civic education in grade ten, including national integration within the framework of Unity in Diversity (nationalism).
- b. Peer assessment is a technique performed by a student (assessor) who assesses the attitude/behavior of other students in areas such as integrity, honesty, tolerance, and mutual respect, mutual cooperation, discipline, and so on.

What follow are a sample self-assessment form on the theme of nationalism and a peer assessment form on the theme of integrity with a score given for each answer (see Table 1 and Table 2).

Table 1. Sample Self-Assessment Form (Theme: Nationalism)

No	Statement	Score (0-3)
1.	In the Dutch colonial era, the Indonesian society was divided into indigenous, European, and Eastern Foreigners. To me, this classification ...	
	a. is natural because the colonial government wanted to divide the Indonesian people	1
	b. must be fought because consequently the Indonesian people increasingly do not understand the essence of the nation	2
	c. is a lesson for the Indonesian people not to be racist	3
	d. is not to be exaggerated	0
2.	Different descendants, nationalities, and traditions in Indonesia are a form of ...	
	a. mixing various ethnic groups in the world who came to Indonesia	2
	b. the origins of Indonesian ancestors that must be traced again	1
	c. national wealth because there is a polite and tolerant group assimilation process	3
	d. there has never been a foreign ancestor in our country	0
3.	When we are in an environment that is different from our traditions, the next thing I will do is...	
	a. take all that the new culture offers into my personality	2
	b. take all the things that fit my culture and reject what is different	1
	c. respect and maintain differences but still hold on to my own identity	3
	d. until now no environment has different traditions	0

No	Statement	Score (0-3)
4.	With regard to the rise of coverage of the Jakarta Election some time ago where social media highlighted the problem of discrimination against nationality, I think ...	
	a. it is natural because everyone has the right to argue even though it is exposed on social media.	1
	b. the public shouldn't express their opinions on social media.	2
	c. there is a need for social media users to learn to be wiser in expressing opinions.	3
	d. it is not an important issue because the communication tools they used are their own.	0
5.	If fellow Indonesian citizens from different ethnic groups are reported to be stumbling on legal issues but being discriminated against, I think ...	
	a. perhaps the person has violated the rules set by the local law.	2
	b. the person must be defended whatever s/he has done because all citizens are equal before law.	1
	c. I will verify the real news so that I can do my best.	3
	d. There is nothing to worry because it is not true news.	0

Table 2. Sample Peer Assessment Form (Theme: Integrity)

Students assessed: 1.

2. (max 5 people)

No	Statement	Score (0-3)			
		always	often	rarely	never
1.	Do not discriminate against friends	3	2	1	0
2.	Reward your friends' achievements	3	2	1	0
3.	Use Indonesian language in the school environment	3	2	1	0
4.	Mock a friend's hometown	0	1	2	3
5.	Mock a friend's parent's job	0	1	2	3

The Results of Expert Validation of the Authentic Assessment Model

The draft of the living values-based authentic assessment model in civic education was validated by practitioners in five high schools in Bandung City and West Bandung Regency, totalling ten civic education teachers and three experts in the field of civic education assessment. Based on the results of the validation, the following scores were obtained.

Table 4. The Results of Expert Validation

No	Components assessed	Aspects assessed	Scores (N=13)		
			Good (%)	Ade-quate (%)	Less (%)
A.	Developing Living Values	1. Developing the living values	91	8	1
		2. Developing the main characteristics	95	5	0
		3. Developing the vision and mission of the school	85	14	1
		4. Developing the basic and core competencies	80	20	0
B	Living Values Education Principles	1. Comprehensive attitude assessment (moral knowing-feeling-action)	76	14	10
		2. The assessment integrates and develops points for internal reflection	52	42	6
		3. The assessment uses real-life cases of students	90	8	2
C.	Attitude Assessment according to Standard Assessment	1. The assessment contains attitude as one aspect of assessment	98	2	0
		2. The assessment of attitude: self-assessment and peer assessment.	90	7	3
D	Assessment Oriented to Development of Higher-order Thinking Skills and Conflict Resolution	1. Focusing on the problem	87	11	2
		2. Analyzing arguments	80	20	0
		3. Considering who can be trusted	80	18	2
		4. Considering observational reports	86	14	0
		5. Comparing conclusions	76	15	9
		6. Drawing conclusions	80	16	4
		7. Considering inductions	84	13	3
		8. Assessing	82	10	8
		9. Defining concepts	70	20	10
		10. Defining assumptions	79	18	3
		11. Describing	78	12	0

No	Components assessed	Aspects assessed	Scores (N=13)		
			Good (%)	Adequate (%)	Less (%)
E.	Assessment Principles	1. Valid	80	14	6
		2. Objective	82	9	9
		3. Fair	75	20	5
		4. Integrated	90	8	2
		5. Transparent	91	9	0
		6. Comprehensive and Sustainable	92	7	1
		7. Systematic	87	12	1
		8. Criteria-based	85	13	2
		9. Accountable	90	8	2
F	Assessment Instrument Writing Principles	1. Content	87	10	3
		2. Construct	78	20	2
		3. Language	75	20	5
Total			82.84	13.65	3.51

Based on the results of the validation of practitioners and experts of the model, the following scores were obtained: 82.84% rated the instrument as good, 13.65% considered it adequate, and only 3.51% rated it unfavorably. The areas that are still considered insufficient and need improvement are aspects of the application of the principles of living values education, HOTS assessment and the preparation of the assessment instruments.

Discussion

Based on the above research results, several findings can be outlined as follows:

First, in essence, authentic assessment is an innovative move from assessment that has been traditionally carried out by educators to attain the expected goals. It has not been easy to replace traditional assessment, so the application of authentic assessment in the field has been slow (Mueller, 2011). Authentic assessment is a process of evaluating student success in achieving educational goals through student performance reflected in learning activities, such as project-based learning in the form of interactive multimedia creation, serving the community through

service learning, and higher-order thinking skills in problem-based learning (Komalasari & Rahmat, 2019; Komalasari & Saripudin, 2019). Teachers explicitly communicate the assessment standards which will be used to assess the learning activity to the students, so that students can reflect on their abilities (Hart, 1994; Litchfield & Dempsey, 2015). There are several reasons why teachers need to spend time and effort to make authentic judgments with these criteria, including: 1) knowledge is built when people interact with the world and what is around them (Vu & Dall'Alba, 2008; Saripudin, & Komalasari, 2016); and 2) the use of authentic assessment results in deeper learning (Fook & Sidhu, 2010; Kearney & Perkins, 2011; Svinicki, 2004).

Second, authentic assessment in civic education must encompass: 1) civic literacy awareness; 2) civic engagement; 3) civic skills and participation; 4) civic knowledge; and 5) civic participation and civic responsibility. Authentic assessment also involves various activities such as interviews, group assignments in solving problems, or making a portfolio of writing (Hart, 1994). In the learning process, authentic assessments are a source of positive and effective feedback for students and teachers as they provide more motivation and reflection on skills, as well as independence, rather than solely depending on regular scores on a test (Litchfield, Mata, & Gray 2007).

Third, authentic assessment measures life skills and attitudes. When students see assessment practices as innovative and relevant, they perceive that complete and comprehensive learning can significantly change their abilities (Kearney & Perkins, 2011). When assignments are more intellectually challenging, students will be more likely to produce higher quality work (Koh & Luke, 2009). Assignments must be built to provide students with the opportunity to play a vital role in their learning process. Effective assessment is not something that can be 'stapled' on in the final classmeeting (Burton, 2011). In authentic assessment, students learn the contents of the material, then apply them to meaningful and relevant real-life tasks, as life consists of innumerable choices, problems, and situations that require critical thinking, problem solving, and synthesis. What needs to be understood in depth about learning is the meaningfulness of life that is explored through reflection on living values. Authentic assessment is very well-suited for influencing metacognition and processing information—the beating heart of learning (Azim & Khan, 2012), as well as developing higher order thinking skills in real life (Koh, Tan, & Ng, 2012).

Fourth, a living values based-authentic assessment is an innovation in civic education as it seeks to integrate living values and living values education principles (Tillman, 2004; Saripudin & Komalasari, 2015) with assessment of

attitudes in addition to assessment of knowledge and skills. Such assessment endeavors to develop students' abilities to conduct internal reflection, clarification of values, internalization and implementation of life values through the rational development of a choice of attitude using higher-order thinking skills. Therefore, behavioral patterns, or characters of students are fostered through a critical-analytical-evaluative-creative thinking about moral knowing, moral feeling, and moral action in everyday life (Lickona, 2013).

Conclusion

Living values-based authentic assessment is an innovation in the assessment of civic education because it amalgamates the values of life originating from the *Pancasila* (the ideology of the Indonesian state) as a view of the life of the Indonesian nation and the principles of living values education into authentic assessment. The assessment instruments deployed in this research were in the form of self-assessment and peer assessment. Both forms of assessment are expected to supplement the meaningfulness of authentic assessments in civic education because they do not solely concern assessing knowledge and skills, but more importantly assessing attitudes according to the vision and mission of “nation & character building”.

Acknowledgement

The research is a grant from the Indonesia Ministry of Education and Culture. The author would like to express sincere appreciation for all the support provided.

References

- Azim, S., & M. Khan. 2012. Authentic Assessment: An Instructional Tool to Enhance Students' Learning. *Academic Research International* 2: 314–320.
- Burton, K. (2011). A Framework for Determining the Authenticity of Assessment Tasks: Applied to an Example in Law. *Journal of Learning Design*, 4, 20–28.
- Borg, W.R. & Gall, M.D. (2003). *Educational research: An introduction. Fourth Edition*. New York: Longman.
- Bourke, R., & Mentis, M. (2013). Self-Assessment as a Process for Inclusion. *International Journal of Inclusive Education*, 17(8), 854–867. DOI: 10.1080/13603116.2011.602288.
- Creswell, J.W. (2012). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research*. Boston: Pearson Education, Inc.

- Fook, C., & Sidhu, G. (2010). Authentic assessment and pedagogical strategies in higher education. *Journal of Social Sciences*, 6, 153–161.
- Fraenkel, J.R., & Wallen, N.E. (2008). *How to Design and Evaluate in Research*. New York: The McGraw-Hill Companies, Inc.
- Hart, D. (1994). *Authentic assessment: A Handbook for Educators*, Menlo Park, California: Addison-Wesley Publishing Company.
- Kearney, S.P., & T. Perkins. (2011), *Improving Engagement: The Use of 'Authentic Self and Peer Assessment for Learning' to Enhance the Student Learning Experience*. Paper presented at the Academic and Business Research Institute Conference, Las Vegas, Nevada.
- Koh, K.H., C. Tan, & P.T.Ng. (2012). Creating Thinking Schools through Authentic Assessment: The Case in Singapore. *Educational Assessment, Evaluation and Accountability* 24: 135–149.
- Koh, K., & Luke, A. (2009). Authentic and Conventional Assessment in Singapore Schools: An Empirical Study of Teacher Assignments and Student Work. *Assessment in Education: Principles, Policy and Practice*, 16, 291–318.
- Komalasari, K & Sapriya. (2016). Living Values Education in Teaching Materials to Develop Students' Civic Disposition, *The New Educational Review*, 44(2), 107–124. DOI: 10.15804/tner.2016.44. 2.09.
- Komalasari, K & Saripudin, D. (2017). A Model of Living Values Education-based Civic Education Textbooks in Indonesia. *The New Educational Review*, 47(1). DOI: 10.15804/tner.2017.47.1.11
- Komalasari, K & Saripudin, D. (2018). The Influence of Living Values Education-Based Civic Education Textbook on Student's Character Formation. *International Journal of Instruction*, 11(1), 395–410. DOI: 10.12973/iji.2018.11127a
- Komalasari, K & Rahmat (2019). Living Values Based Interactive Multimedia in Civic Education Learning. *International Journal of Instruction*, 12(1), 113–126. DOI: 10.29333/iji.2019.1218a.
- Komalasari, K & Saripudin, D. (2019). Service Learning Model in Social Studies to Foster Student Social Care. *The New Educational Review*, 56(2), 204–214. DOI: 10.15804/tner.2019.56.2.17.
- Lickona, T. (2013). *Educating for Character: How Our Schools Can Teach Respect and Responsibility*. New York-Toronto-London-Sydney-Auckland: Bantam Books
- Litchfield, B.C. & J.V. Dempsey. (2015). Authentic Assessment of Knowledge, Skills, and Attitude: *New Directions for Teaching and Learning*, *New Directions for Teaching and Learning* 142, 65–80. DOI: 10.1002/tl.20130
- Litchfield, B.C, J. Mata, & L. Gray. (2007). Engaging General Biology Students with Learning Contracts. *Journal of College Science Teaching* 37: 34–39.
- Mueller, J. (2011). Authentic Assessment Toolbox.. Accessed 08/09/2020. <http://jonatan.muller.faculty.noctrl.edu/toolbox/whatisist.htm>
- Rohayani, I, Danial, E., Malihah, E., & Sundawa, D. (2018). Authentic Assessment to Enhance Students' social Responsibility Character. *Proceeding of 1st Annual Civic Edu-*

- ation Conferences. Advances in Social Science, Education and Humanities Research*, 251, 186–188. DOI:10.2991/acec-18.2018.45.
- Regulation of the Minister of Education and Culture No 23 year 2016 on Educational Assessment Standards.
- Saripudin, D. & Komalasari, K. (2015). Living Values Education in School's Habituation Program and Its Effect on Student's Character. *The New Educational Review*, 39 (1), 51–62.
- Saripudin, D. & Komalasari, K. (2016). Culture-based Contextual Social Studies Learning for Development of Social and Cultural Values of Junior High School Students. *The Social Sciences*, 11, 5726–5731. DOI: 10.3923/sscience.2016.5726.5731.
- Stiggins, R.J. (2006). *Student-centered Classroom Assesment*. New York : Macmillan College Publishing Company.
- Svinicki, M. (2004). *Learning and Motivation in the Postsecondary Classroom*. San Francisco, CA: Jossey-Bass.
- Tillman, D. (2004). *Living Values: Activities for Children Ages 8–14*. Jakarta: PT Gramedia Widiasarana Indonesia.
- Uno, H.B. & Satria, K. (2012). *Asesmen Pembelajaran* [Learning Assessment]. Jakarta: Bumi Aksara
- Vu, T.T., & G. Dall'Alba. (2008), December. Exploring an Authentic Approach to Assessment for Enhancing Student Learning. Paper presented at the annual meeting of the Australian Association for Research in Education Brisbane, Australia.

Character Based on Multicultural and Local Wisdom in Early Childhood: The Construction of a Research Instrument

DOI: 10.15804/tner.2020.61.3.15

Abstract

The purpose of this study was to confirm the construct of the multicultural and local wisdom character research instrument of early childhood. Respondents were 430 early children. Data analysis using the CFA approach. The results showed that the four conceptual dimensions of character were empirically proven to group into four dimensions. Each dimension is corrected for sub dimensions and indicators based on the loading factor score criteria, cronbach alpha reliability, rho-A score, composite reliability > 0.70 , average variance extracted > 0.50 . There are 29 indicators that meet valid, reliable criteria and fit model.

Key words: *multicultural and local wisdom, character, early childhood, research instrument.*

Introduction

The multicultural and multi-ethnic condition of Indonesia requires educational institutions to be able to develop children so that they have ethnic literacy and are tolerant of cultural diversity. Cultural diversity that exists arises from various aspects of life, such as religion, ethnicity, ancestry, socioeconomic conditions, and stages of power. Implementing multicultural character based education requires an appropriate, effective and participatory strategy involving all components

of education. There is a need for greater government support for multicultural education in the field of policy implementation (Watkins, Lean, & Noble, 2016).

In implementing multicultural-based character education and local wisdom, we not only reassemble the values of unity and nationality in the current era of globalisation, but also try to redefine the sense of nationality itself in the face of clashes between various social-cultural, economic and political factors in the world. In other words, through implementation of this multicultural education, it is expected that all forms of discrimination (Janakiraman, Watson, Watson, & Bawa, 2019), violence (Au, 2017), and injustice that are largely motivated by cultural differences such as differences in religion, race, ethnicity, language, abilities, gender, age and socio-economic class can be minimized. In order to achieve the objectives of multicultural education, it is necessary to have the role and support of teachers / teaching staff, educational institutions, and other educational policy makers, especially in the application of curriculum with multicultural and local wisdom approaches.

Teachers and educational institutions (schools) play an important role in applying the principles of multicultural education at all levels of education (Olur & Oguz, 2019). In addition, teachers need to understand the concept of multicultural education in a global perspective so that the values contained in this education can be taught as well as practiced in front of students. Consequently it is hoped that through the development of multicultural education these students will more easily understand the lessons and increase their awareness so as to help them always behave in a humanistic, pluralist and democratic manner. Multicultural education can be achieved when implemented into classrooms (Villegas, 2019). In the end the students are expected to become a “multicultural generation” ready in the future to face the conditions of society, the state and the world that are difficult to predict with discipline, caring humanism, upholding morality, honesty in daily behavior and applying democratic values, justice and humanity. Implementing multicultural-based character education and local wisdom in schools requires an appropriate strategy. The accuracy of the strategies selected will provide optimal results in forming students with character. Thus efforts to develop character education models as a strategy for implementing multicultural character education are very important.

Multicultural and local wisdom character includes four character dimensions that will be instilled and developed for early childhood students. The four dimensions are character dimensions related to the relationship of divinity, self, others, and the environment. The dimension of the character of the divinity relationship is the attitude or behavior of early childhood in carrying out God's commands and

prohibitions in daily life. Humans are beings who are aware of God (Wach, 1984). The beliefs held, morals, and worship according to religious teachings are aspects that exist in the divine dimension. The relationship between moral conduct, right belief, and worship is a religious criterion. A strong belief in divinity will shape the character and life of early childhood. In student's early childhood the process of religious development is still receptive. His religious experience includes forms of thought, forms of action, and forms of fellowship (Wach, 1984). The relationship of the divine dimension shown will provide self-identity, give new status, and moral development or support (O'dea, 1966).

The dimension of the character of the relationship with oneself is the attitude and behavior of early childhood students towards themselves. Every child grows as an intelligent, good, and capable individual responsible for the development of his own life. Individuals actually develop their character and intelligence (Ryan & Bohlin, 1999). For example students must be able to develop a responsible and independent character. Responsibility is the attitude and behavior to carry out their duties and obligations as they should. Independence is the attitude and behavior of early childhood that is not easy to depend on others in completing tasks.

The dimension of the character of relationships with others is the attitudes and behavior of early childhood students towards others. No one is great without the help of others (Thompson, 2005). Relationships with others, for example, respect for others and being polite to fellow people. Students who value others are students whose attitudes and actions respect the weaknesses or strengths of others. Courtesy is a subtle and good quality in early childhood students from the point of view of language or behavior to others. Very open attitude is needed to be able to build communication with others. Having a communicative attitude means being willing to communicate and discuss with other people or colleagues.

The dimension of the character of the relationship with the environment is the attitudes and behavior of early childhood students towards the environment in which they are. The family environment, the school environment, and the community environment are places where young children interact. Caring for the environment is the attitude and behavior that does not damage the surrounding natural environment. Social care is the attitude and action of giving assistance to others. Friendliness is an action that shows a sense of fun hanging out and working with others.

In the development of multicultural and local wisdom character there are various kinds of variations in the determination of the character values to be developed in schools. The character value is contained in four character dimensions. Character values that have been developed in early childhood students

in kindergarten need to be assessed. Character is part of the affective domain. Assessment in the affective domain is obtained through measurement or observation. One instrument that can be used in assessing the character of every child is a questionnaire. Based on the description above, the purpose of this study is to construct an instrument of multicultural and local wisdom character assessment of early childhood that fulfills valid and reliable criteria.

Problem of Research

In the era of the industrial revolution 4.0 and society 5.0, it is very important to introduce character education based on multicultural values and local wisdom in early childhood character values have long played a role in philosophical conversation, that is, since Plato placed good character at the top in the hierarchy of values (Hersh, Miller, & Fielding, 1980). Good character includes three components, namely moral knowledge, moral feelings and moral actions (Lickona, 1991). Character is a concept that shows determination and consistency between the behavior and opinions of individuals which is a match between attitudes and behavior (Çağatay, 2009). Character traits are long-lasting patterns of behavior that can be generalized as personality characteristics (Diggs & Akos, 2016). Meanwhile, Khoury (2017) states that character is associated with positive behavior or virtues. Thus character education is a form of strengthening the value of goodness and is done from early childhood.

Early childhood character based on multicultural values and local wisdom should ideally begin before the stage of basic education through formal education such as in kindergarten (TK), *raudhatul athfal* (Islamic early childhood education) (RA), and other similar forms. Characters that are formed or developed from an early age will produce strength of character as an adult. With the strength of character it will not be easy to experience degradation or crisis of character (Harun, Jaedun, Sudaryanti, & Manaf, 2020).

The problem in this research is the lack of implementation of multi-cultural character education based on local wisdom in kindergarten and the lack of availability of evaluation instruments (for assessment and measurements) of early childhood character in aspects of: (1) character in relation to oneself; (2) character in relation to divinity; (3) character in relation to others; (4) and character in relation to the environment.

Research Focus

The focus of this research is to confirm the dimensions, subdimensions, and indicators of early childhood multicultural and local wisdom character and pro-

duce valid and reliable early-age character assessment instruments. Valid can be defined as to what extent conclusions from certain assessment results can be made accurately (Mahrens & Lehman, 1991). Reliability can be interpreted as consistency or stability of assessment results (Reynolds, Livingston, & Willson, 2010).

Methodology of Research

General Background of Research

This study aims to confirm dimensions, subdimensions and indicators of multicultural and local wisdom in early childhood, produce a valid and reliable instrument to measure early childhood character and report the stages of development of the instrument. The stages of instrument development use the procedure suggested by (McCoach, Gable, & Madura, 2013)

Sampel of Research

Research sites in Indonesia, Central Java Province, specifically the Surakarta Residency and the Kedu Residency. The subjects of the study were 430 children (3 years old until 5 years old), spread across 24 kindergartens from 7 districts in 4 regency / city, namely Magelang City and Surakarta City, and Magelang Regency and Sukoharjo Regency in Central Java Province as summarized in Table (1).

Table 1. Location data and number of research respondents

Region	Regency / City			
Districts	Magelang regency	Magelang city	Surakarta City	Sukoharjo regency
Srumbung	120	0	0	0
Magelang selatan	0	119	0	0
Laweyan	0	0	81	0
Banjarsari	0	0	19	0
Baki	0	0	0	62
Grogol	0	0	0	14
Mojolaban	0	0	0	15
Σ Child	120	119	100	91

Instrument and Procedures

The main instrument in data collection is a questionnaire with a Likert scale (*never, ever, sometimes, and always*). There are 53 statement items. Character in relation to divinity consists of four sub-variables, namely (T1) belief / creed; (T2) diligently worshiping; (T3) willingness to act; (T4) the value of manners / morals; Character in relation to oneself consists of four sub-variables, namely; (D1) honesty; (D2) discipline; (D3) responsibility; (D4) independence. Character in relation to others consists of four sub-variables, namely (S1) aware of the rights and obligations of self and others (S2) Complying with legal and customary rules; (S3) respecting the work and achievements of others; (S4) Being polite other people. Character in relation to the environment consists of four sub-variables, namely (L1) national spirit; (L2) love of the motherland; (L3) friendly / communicative; (L4) caring about the environment.

The instrument development procedure uses the stages suggested by (McCoach, Gable, & Madura, 2013) which are modified into 12 steps, namely: (1) instrument specifications; (2) reviewing existing instruments; (3) construct description and initial concept definition; (4) component specifications of the construct; (5) development of the final concept definition for each component; (6) establishing operational definitions; (7) choosing a scale and determining indicators; (8) making and attaching items to components / constructs; (9) examine instrument items; (10) making a prototype version of the instrument; and (11) instrument trials.

At the time of testing the instrument required the role of teachers who teach in kindergarten (TK). Early childhood students have not been able to fill in the instruments created because of the limitations in reading and understanding the contents of the statement items. It is the teacher who knows the good attitudes and behavior of students while at school, so in filling out the instruments the teacher has a role in filling it. Every teacher who teaches in kindergarten is given the responsibility to assess each student based on the instrument. The teacher in filling out the instruments is assisted by the filling instructions that have been provided

Data Analysis

The steps of data analysis follow the confirmatory factor analysis (CFA) procedur to select indicators, subdimensions, from the conceptual dimension of theoretical multicultural and local wisdom character with the help of *Smart-PLS software version 3.0* and *LISREL version 8.50*.

Results of Research

Multicultural and local wisdom character in the early childhood have four dimensions namely divinity, oneself, others, and environment. The divinity dimension has 4 subdimensions, which are belief, worship, sincerity, and the value of manners / morals.

Table 2. Validity and reliability of the conceptual dimension of Divinity

Score factor loading		
Indicator	T1	T4
T11	0.816	
T12	0.827	
T13	0.784	
T41		0.806
T42		0.906
T43		0.889
Discriminant validity		
Subdimension	T1	T4
T1 (Belief)	0.809	
T4 (The value of manners / morals)	0.512	0.868
Reliability		
Criteria	T1	T4
Cronbach's Alpha	0.737	0.837
rho_A	0.74	0.865
Composite Reliability	0.85	0.901
Average Variance Extracted (AVE)	0.655	0.753

The divinity dimension has 4 subdimensions. Each subdimension has 3 indicators. Based on the CFA analysis, the ones who qualify to be subdimensions of the divinity dimension are T1 (Belief) and T4 (The value of manners / morals) because they have a loading factor score, Cronbach's alpha reliability, rho-A score, composite reliability > 0.70 , AVE > 0.50 and root AVE curve is greater than the correlation score between constructs (Discriminant Validity) as in Table (2).

The oneself dimension has 4 subdimensions, which are honest, disciplined, responsibility, and independence. Each subdimension has 3 indicators. Based on the CFA analysis, those who fulfill the requirements to become subdimensions of the self dimension are D3 (Responsibility) and D4 (Independence) because they

have a loading factor score, Cronbach alpha reliability, rho-A score, composite reliability > 0.70 , AVE > 0.50 and root AVE curve is greater than the correlation score between constructs (Discriminant Validity) as in Table (3).

Table 3. Validity and reliability of the conceptual dimension of self

Score factor loading		
Indicator	D3	D4
D31	0.797	
D32	0.861	
D33	0.871	
D41		0.848
D42		0.838
D43		0.850
Discriminant validity		
Subdimension	D3	D4
D3 (Responsibility)	0.844	
D4 (Independence)	0.626	0.845
Reliability		
Criteria	D3	D4
Cronbach's Alpha	0.797	0.801
rho_A	0.801	0.802
Composite Reliability	0.881	0.882
Average Variance Extracted (AVE)	0.712	0.714

Table 4. Validity and reliability of conceptual dimension of others

Score factor loading		
Indicator	S3	S4
S31	0.849	
S32	0.836	
S33	0.875	
S41		0.843
S42		0.843
S43		0.765
S44		0.727

Discriminant validity		
Subdimension	S3	S4
S3 (Respecting the work and achievements of others)	0.853	
S4(Be polite to fellow people)	0.689	0.796
Reliability		
Criteria	S3	S4
Cronbach's Alpha	0.813	0.806
rho_A	0.816	0.813
Composite Reliability	0.889	0.873
Average Variance Extracted (AVE)	0.728	0.634

The dimension of doing good to others has 4 subdimensions, namely aware of the rights and obligations of self and others; comply with legal and customary rules; respecting the work and achievements of others; and be polite to fellow people. Each subdimension has 3 indicators, except S4 has 4 indicators. Based on the CFA analysis, those who fulfill the requirements to b subdimensions of good behavioral dimensions towards others are S3 (Respecting the work and achievements of others) and S4 (Be polite to fellow people) because they have a loading factor score, Cronbach alpha reliability, rho-A score, composite reliability > 0.70 , AVE > 0.50 and the AVE roots of the quadrature are greater than the correlation score between constructs (Discriminant Validity) as in Table (4).

Table 5. Validity and reliability of conceptual dimension of environment

Indicator	Score factor loading		
	L1	L3	L4
L12	0.820		
L13	0.886		
L14	0.910		
L15	0.838		
L31		0.817	
L32		0.806	
L33		0.837	
L41			0.881
L42			0.910
L43			0.744

Discriminant validity			
Subdimension	L1	L3	L4
L1 (Nationality)	0.864		
L3 (Friendly)	0.556	0.820	
L4 (Care)	0.521	0.560	0.848
Reliability			
Criteria	L1	L3	L4
Cronbach's Alpha	0.887	0.759	0.800
rho_A	0.894	0.771	0.804
Composite Reliability	0.922	0.860	0.884
Average Variance Extracted (AVE)	0.747	0.672	0.719

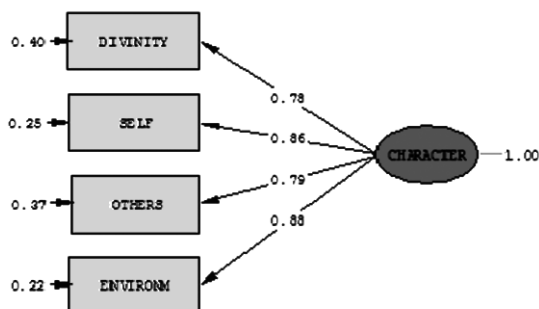
The dimension character in relation to the environment has 4 subdimensions, namely the spirit of nationalism, love of the motherland, being friendly with anyone, and caring for the environment. Each subdimension has 3 indicators, except L1 has 5 indicators. Based on the CFA analysis, those who qualify to be a subdimension of good behavioral dimensions to the environment are L1 (National spirit), L3 (Friendly), and L4 (Care) because they have a loading factor score, Cronbach's alpha reliability, rho-A score, composite reliability > 0.70, AVE > 0.50 and the square root of the Kuradrat AVE is greater than the correlation score between constructs (Discriminant Validity) as in Table (5).

Based on the description above, it can be concluded that the conceptual dimension of multicultural and local wisdom character still has four dimensions, but with the changing dimensions as inTable (6).

Table 6. Dimensions and subdimensions after the CFA process

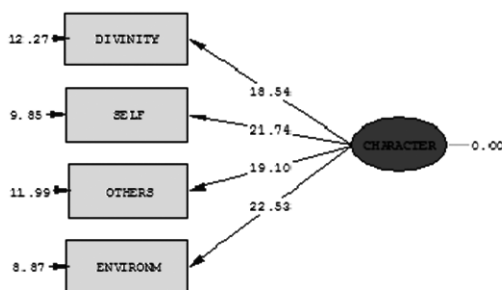
Dimension	Subdimension		Σ Indicator
	Beginning	Becomes	
Divinity	T1, T2, T3, T4	T1, T4	3, 3.
Self	D1, D2, D3, D4	D3, D4	3, 3.
Others	S1, S2, S3, S4	S3, S4	3, 4.
Environment	L1, L2, L3, L4	L1, L3, L4	4, 3, 3.

The four dimensions formed are tested for goodnes of fit of a model that can be assessed based on fit criteria. The results of testing a hypothetical model of an instrument for evaluating multicultural and local wisdom character for early childhood are presented in Figure (1) and Figure (2).



Chi-Square=0.51, df=2, P-value=0.77366, RMSEA=0.000

Figure 1. Path diagram of first order loading factor values



Chi-Square=0.51, df=2, P-value=0.77366, RMSEA=0.000

Figure 2. Path diagram of First order T-value

The four dimensions of multicultural and local wisdom character for early childhood have a factor loading value > 0.5 and have a T-value > 1.96. Independence value AIC = 1055.48, model AIC = 16.51, saturated AIC = 20.00, independence CAIC = 1075.73, CAIC model = 57.02, saturated CAIC = 70.64, normed fit index (NFI) = 1.00, non-normed fit index (NNFI) = 1.00, parsimony normed fit index (PNFI) = 0.33, comparative fit index (CFI) = 1.00, incremental fit index (IFI) = 1.00, relative fit index (RFI) = 1.00, critical N (CN) = 7779.10, root mean square residual (RMR) = 0.00091, standardized RMR = 0.0033, goodness of fit index (GFI) = 1.00, adjusted goodness of fit index (AGFI) = 1.00, and Parsimony

Goodness of Fit Index (PGFI) = 0.20. The construct of multicultural character education for early childhood fulfills the fit model criteria with chi-square values $< 2df$; p -value > 0.5 ; Root Mean Square of Error Approximation (RMSEA) < 0.08 , and Goodness of Fit Index (GFI) > 90 .

Discussion

The main purpose of this article is to confirm the dimensions, subdimensions and indicators of multicultural and local wisdom character of early childhood and produce valid and reliable early childhood character instruments. The conceptual dimension of the divinity obtained indicators that meet the criteria for loading factors, namely T11, T12, T13, T41, D42 and D43. The T1 (Belief) dimension is constructed from indicators T1, T2, T3 with a factor loading score from 0.784 to 0.827. Whereas the T4 (The value of manners / morals) subdimension is constructed from indicators D41, D42, D43 with a factor loading score of 0.806 to 0.906. The T1 and T4 dimensions have Cronbach's Alpha coefficients 0.737 to 0.837. Thus, the divine dimension has two valid and reliable subdimensions. The dimension of the instrument is said to be reliable if Cronbach's Alpha coefficient > 0.7 (Hair, Anderson, Tatham, & Black, 2010). It can be concluded that one's self-belief and divinity meet valid and reliable criteria. In addition, the divine dimension (religius) is very important for every child (Shek, 2012). While Shek & Zhu (2018) stated that moral competence and spirituality affect behavior development. Many experts argue that spirituality is an important source of resilience, an asset in dealing with negative life experiences, and can help children overcome the difficulties and problems of life in an adaptive way (Koenig, 2010). There are several ways to develop spirituality in children, namely strategies: (1) understanding various forms of religion and spirituality through various media, including print and non-print media; (2) enhanced understanding is important as far as religious and spiritual beliefs are concerned; and (3) active reflection and experience are important processes in developing spirituality (Shek, 2012).

The conceptual dimensions of self obtained indicators that meet the criteria for loading factors are D31, D32, D33, D41, D42 and D43. The D3 dimension (Responsibility) is constructed from indicators D31, D32, D33 with a loading factor score from 0.797 to 0.871. Whereas the D4 (*Independence*) subdimension is constructed from indicators D41, D42, D43 with a factor loading score of 0.838 to 0.850. The D3 and D4 dimensions have Cronbach's Alpha coefficients from 0.797 to 0.801. Thus, self-dimension has two valid and reliable subdimensions.

The results of this study are in line with the results of previous studies (Harun, Jaedun, Sudaryanti, & Manaf, 2020). Responsibility and independence are knowing *mora* values possessed by early childhood students. With the value of responsibility implanted in school, a child feels obliged to follow the rules and see the rules in total. A child who has responsibility and is independent shows his moral competence. Moral competence includes responsibility for personal choice and responsibility to serve others (Martin & Austin, 2010).

The conceptual dimensions of others obtained indicators that meet the criteria for loading factors namely S31, S32, S33, S41, S42, S43 and S44. The S3 (Respecting the work and achievements of others) dimension is constructed from indicators S31, S32, S33 with a factor loading score from 0.836 to 0.875. The S4 (Be polite to fellow people) dimension is constructed from indicators S41, S42, S43, S44 with a factor loading score of 0.727 to 0.843. The dimensions of S3 and S4 have Cronbach's Alpha coefficients 0.806 to 0.813. Thus, fellow dimensions have two valid and reliable subdimensions. Doing good to others or social care is very important to be developed in early childhood, in which there is moral knowledge, good moral feelings and moral actions (Lickona, 1991; Komalasari, Abdulkarim, & Saripudin, 2018).

Conceptual dimensions of the environment obtained by indicators that meet the criteria for loading factors are L12, L13, L14, L15, L31, L32, L33, L41, L42 and L43. The L1 (Nationality) dimension is constructed from indicators L12, L13, L14, L15 with a factor loading score from 0.820 to 0.910. The L3 (Friendly) dimension is constructed from indicators L31, L32, L33 with a factor loading score of 0.806 to 0.837. The L4 (Care) dimension is constructed from indicators L41, L42, L43 with a loading factor score of 0.744 to 0.910. The L1, L3 and D4 dimensions have Cronbach's Alpha coefficients 0.759 to 0.887. Thus, environmental dimensions have three valid and reliable subdimensions. The dimensions of doing good among humans and the environment meet valid criteria (Hair, Anderson, Tatham, & Black, 2010).

Based on the four dimensions obtained, the goodness of fit test results obtained that the construct model of the instrument meets the fit model criteria. Chi square value = 0.51 with $df = 2$, p -value = 0.773, RMSEA = 0.000, and GFI = 1.00. According to Hair, Anderson, Tatham, & Black (2010) there are three criteria for goodness of fit namely absolute fit indices, incremental fit indices, and parsimony fit indices. The instrument construction is made to meet the absolute fit indices. An instrument that meets the fit model means that the structural equation in the path diagram can explain the covariance relationship between variables and their dimensions.

Comparison of the four dimensional constructs, namely the dimension of the character of the relationship with the environment has the greatest effect produced in the implementation of multicultural and local wisdom character compared to other character dimensions. This is known from the t-value generated at 22.53. The dimensions of the character of the relationship with oneself have a greater influence compared to the dimensions of relationships others and divinity. The resulting t-value is 21.74. The dimension of the character of relationships with others has a greater influence than the dimension of divinity. The t-value obtained is 19.10. While the dimensions of the relationship with divinity have the smallest influence. The resulting t-value is 18.54. Thus in the implementation of early childhood character in kindergarten (TK) all dimensions of character have been embedded and developed in early childhood students.

Dimensions, subdimensions, and indicators developed can be used in the assessment of the character of early childhood. The teacher has the responsibility for student assessment (Zhang, 2003), so teachers must have the competence to manage the multicultural education environment properly (Olur & Oguz, 2019). Multicultural character education are forms of strengthening the character of early childhood. Long-lasting patterns of behavior that can be generalized into personality characteristics (Diggs & Akos, 2016). The implementation of multicultural education is expected to eliminate forms of discrimination (Janakiraman, Watson, Watson, & Bawa, 2019) and violence (Au, 2017).

Conclusions

Based on the construction process of the research instrument, it is known that the conceptual dimension of multicultural and local wisdom character still has four dimensions, namely divinity, self, others, and the environment. The four conceptual dimensions are proven empirically clustered into four dimensions. Each dimension was corrected for subdimensions and items based on the loading factor score criteria, Cronbach alpha reliability, rho-A score, composite reliability > 0.70, Average Variance Extracted (AVE) > 0.50 and the square root of the square of the AVE is greater than the correlation score between constructs. A total of 29 indicators were produced that met the valid dan reliable criteria. The dimension of the character of the divinity relationship has 6 indicators which are divided into two subdimensions, namely belief (T1) and the value of manners / morals (T2). The dimension of the character of the relationship with oneself has 6 indicators which are divided into two subdimensions, namely responsibility (D3) and

independence (D4). The dimension of the character of relationships with fellow humans has 7 indicators which are divided into two subdimensions, namely respect (S3) and courtesy to others (S4). The potential character of the relationship to the environment has 10 indicators which are divided into three subdimensions, namely the spirit of nationality (L1), friendship with anyone (L3), and care for the environment (L4). The results of the goodness of fit test of a multicultural character education construct model of early childhood meet the absolute fit model criteria with a chi-square value $< 2df$; $p\text{-value} > 0.5$; Root Mean Square of Error Approximation < 0.08 , and Goodness of Fit Index > 90 . Dimensions of the character of the relationship with the environment have the greatest effect generated in the implementation of multicultural character education compared to other character dimensions.

The concept of an early childhood character kindergarten can provide comprehensive information for principals and teachers. From the use of these instruments it can be seen that the dominant dimension of character is formed in early childhood so that it can be done to strengthen a more integrated character education. The resulting instrument also fulfills valid and reliable criteria.

Suggestions for further researchers who want to use multicultural and local wisdom character assessment instruments for early childhood should be conducted trials on a broader scale so that they can produce better quality assessment instruments. The construct model should be developed further in making software so as to facilitate evaluators in the tabulation process and find out the results of the assessment quickly.

References

- Au, W. (2017). When multicultural education is not enough. *Multicultural Perspective*, 19(3), 147–150.
- Çağatay, Ş.M. (2009). The role of school in character education and development according to teachers' views. *Unpublished master's thesis*. Çanakkale Onsekiz Mart University, Çanakkale.
- Diggs, C.R., & Akos, P. (2016). The promise of character education in middle school: a meta-analysis. *Middle Grades Review*, 2(2).1–19.
- Hair, J.F., Anderson, R.E., Tatham, R.L., & Black, W.C. (2010). *Multivariate data analysis* (4th ed.). New Jersey: Prentice Hall.
- Harun, Jaedun, A., Sudaryanti., & Manaf, A. (2020). Dimensios of early childhood character education in facing industry revolution 4.0. *International Conference on Educational Research and Innovation* (ICERI 2019), Atlantis Press. 12–17
- Hersh, R.H., Miller, J.P., & Fielding. G.D. (1980). *Model of moral education: An Appraisal*. New York: Longman Inc.

- Janakiraman, S., Watson, W.R., Watson, S.L., & Bawa, P. (2019). Instructional design and strategies for multicultural Education: A qualitative case study. *Journal of Educational Research and Practice*, 9(1), 300–3015
- Khoury, R. (2017). Character education as a bridge from elementary to middle school: a case study of effective practices and processes. *International Journal of Teacher Leadership*, 8(2). Fall 2017. 49–67.
- Koenig, H.G. (2010). Spirituality and mental health. *International Journal of Applied Psychoanalytic Studies*, n/a–n/a. doi:10.1002/aps.239
- Komalasari, K., Abdulkarim, A., Saripudin, D. (2018). Culture-Based social sciences learning model in developing student multiculturalism. *The New Educational Review*. 51(1),173–183. DOI: 10.15804 / tner.2018.51.1.14
- Lickona, T. (1991). *Educating for character: how our school can teach, respect and responsibility*. New York: Toronto London Sydney Auckland.
- Martin, D.E., & Austin, B. (2010). Validation of the moral competency inventory measurement instrument. *Management Research Review*, 33(5), 437–451. doi:10.1108/01409171011041884
- Mehrens, W.A., & Lehman, I.J. (1991). *Measurement and evaluation in education and psychology*. New York: Holt, Rine Hart & Winsto, Inc.
- Mccoach, D. B., Gable, R.K., & Madura, J.P. (2013). *Instrument developmet in the affective domain*. New York: Springer.
- O’Dea, T.F. (1966). *The sociology of religion*. Englewood Cliffs, NJ: Prentice-Hall.
- Olur, B., & Ogus, A. (2019). Qualification perception of prospective teacher on multicultural Education: A Need Assessment. *Development*, 8(4), 165–185.
- Reynolds, C.R., Livingston, R. B & Willson, V. (2010). *Measurement and assessment in education*. Mexico City: Pearson Education, Inc.
- Ryan, K., & Bohlin, K.E. (1999). *Bulding character in schools: practical ways to bring moral instruction to life*. San Francisco: Jossey-Bass.
- Shek, D.T.L. (2012). Spirituality as a positive youth development construct: a conceptual review. *The Scientific World Journal*, 1–8.
- Shek, D.T.L., & Zhu, X. (2018). Self-reported risk and delinquent behavior and problem behavioral intention in Hong Kong adolescents: The Role of Moral Competence and Spirituality. *Frontiers in Psychology*.
- Thompson, L.A. (2005). *A powerful 4-step plan for becoming a star in anything you do*. New York: McGraw-Hill.
- Villegas, A. (2019). Multicultural education implemented in elementary schools. *Capstone Projects and master’s Theses*. 455.
- Wach, J. (1984). *Comparative study of religion*. Chicago: Clombia University Press.
- Watkins, M., Lean, G., & Noble, G. (2016). Multicultural education: the state of play from an Australian perspektif. *Race Ethnicity and Education*, 19(1), 46–66
- Zhang, Z., & Burry-Stock, J.A. (2003). Classroom assessmennt practices and teachers self perceived assessment skill. *Journal Applied Measurement in Education*, 16(4), 323–342.

2021 New
E|Educational
Review



**Some
Aspects of
Psychology**

Further Validation of Spiritual Values Scale

DOI: 10.15804/tner.2020.61.3.16

Abstract

Many positive behaviours of youth are related to their values. In the field of education value assessment is central. However value expression is often very ambiguous. Therefore in an attempt to measure values with more universal, global, and cross cultural perspectives, Nazam, Husain and Khan (2015) developed a spiritual values scale. The initial validation of the scale was based on item content analysis, item reliability, internal consistency, and exploration of the factorial structure of spiritual values. But values are subjected to change due to many factors. Therefore revalidation of the scale remains an important research consideration. The present study extends the initial validation of the scale by using structure equation modelling to revalidate the dimensionality and reliability of the spiritual values scale. The sample consisted of 300 adolescents. The results suggested that out of 27 items 4 items to measure spiritual values are ineffective. The scale with 23 items still remains a reliable and valid psychological tool to assess the spiritual values of adolescents.

Keywords: values, spiritual, construct, convergent, validity, reliability.

Introduction

Value cultivation and assessment have always been central to the character building and moral education of young people. Some values such as love, peace, respect, tolerance, forgiveness, co-existence, and non-violence are indispensable and should be accepted by all educators worldwide (Yojna, 2015). Values impact many behaviours of adolescents, such as career decision making (Nisha, Anjali,

& Sarita, 2016), pro-social decisions under social influence (Wei, Zhao, & Zheng, 2016), academic honesty vs. dishonesty (Koscielniak & Bojanowska, 2019), aggressive behaviour (Knofo, Danie, & Kassabri, 2008), academic achievement (Tarabashkina & Lietz, 2011; Asghar, Rathore, & Siddiqui, 2019), participation in school activities (Hofer, Schmid, Fries, Zivkovic, & Dietz, 2009), suicide attempts (Eskin, 2013) and sexual behaviour (Goodwin, Realo, Kwiatkowska, Kozlova, Nguyen, & Nizharadze, 2002).

An attempt was made to assess the spiritual values of adolescents by Nazam, Husain, and Khan (2015). They developed a spiritual values scale with the conceptual definition that spiritual values are the integrative values of the human soul consisting of altruistic values, humanistic values, personal values, divine values, and affective values which lead to spiritual growth of the personality.

The Spiritual Values Scale: An overview

The original development and validation of the scale was a two stage process. To begin with, 60 values were listed based on the study of religious scriptures including the Holy Quran, the Bhagavad Gita, the Holy Bible, and the scriptures of Jainism and Buddhism. On the basis of 100% agreement of experts in education, psychology, philosophy, and theology 40 spiritual values were selected for pilot study among adolescents studying in the schools of Aligarh city, India. The subjects had to respond on a five-point Likert rating scale, ranging from strongly agree to strongly disagree, showing the importance they attach to the values. Item analysis was done to check the reliability of each value. After item analysis 27 values were retained. In the second stage the scale was administered to 400 adolescents (200 males & 200 females) studying in schools of Aligarh City, India. Twenty seven spiritual values were subjected to principle component analysis with orthogonal Varimax rotation to extract the factorial structure of the scale, which yielded five factors. These five factors were named as *Altruistic values* (Item no. 1-Charity, 12-Kindness, 13-Love, 14-Modesty, 18-Reliance on God, 19-Repentance, 25-Truthfulness, and 26-Unity), *Humanistic Values* (Item no. 4-Courage, 5-Forgiveness, 9-Goodness, 16-Power, 22-Sincerity, and 27-Wisdom), *Personal Values* (Item no. 6-Fortitude, 7-Forbearance, 10-Humility, 17-Righteousness, 20-Selflessness, 21-Self-restraint, and 23-Steadfastness), *Divine Values* (Item no. 2-Compassion, 15-Piety), and *Affective Values* (Item no. 3-Contentment, 8-Gentleness of Speech and 24-Tenderness). The reliability (Internal Consistency) of the scale was measured by Cronbach's coefficient Alpha ($\alpha=0.911$) for the full scale. For judging the internal consistency of this scale George and Mallery's (2003) rule of thumb was adopted ($\geq .9$ -Excellent, $>.8$ -good, $\geq .7$ - Acceptable, $\geq .6$ - Questionable, $\geq .5$ -Poor,

≤ .5-Unacceptable). Hence the scale has excellent reliability. The inter-factorial validity was also calculated to assure that all the factors are moderately correlated, confirming the dimensionality of this scale.

Rationale for the study

Researchers have marked corrosion of values by factors such as media, globalization, high stake exams, and family system change (Taneri, Gao, & Johnson, 2016). Globalization has changed the nature of society from a classical- conservative society to an open society and this results in negative behaviour such as arrogance (Al Zyond, 2009). Social transformation changes the nature of society from collective civilization to an individualistic, self-development civilization that results in selfishness (Taneri, Gao, & Johnson, 2016). “Youth are being faced with peculiar problems in their societies that tend to challenge moral stance, they are surrounded with people who have thrown morality aside and are making it” (George & Uyanga, 2014, p.43). Such changes may influence spiritual values such as selflessness, compassion, kindness, charity, unity etc. Therefore despite the good psychometric characteristics of spiritual values and growing interest in the use of this scale; revalidating the factorial structure of the scale remains equally important.

This study also aims to explore the convergent validity of the spiritual values scale. Convergent validity is related to construct validity (Gregory, 2007). It is a way of assessing the construct validity of a test (Campbell & Fiske, 1959). Theoretically spiritual values and spiritual intelligence seem to be associated with each other. Spiritual intelligence has been conceptualized by different scholars as reflecting values and meaning (Sahebalzamani, Farahani, Abasi, & Talebi, 2013). It is characterized by values such as compassion, forgiveness, modesty, and justice (Baheri, Akbarizade, & Hatami, 2010). Compassion, harmony, forgiveness, modesty, and justice and wisdom are factorially derived values of the spiritual values scale (Nazam, Husain, & Khan, 2015). Spiritual sources and values are also proposed as the content of spiritual intelligence which enhances the daily functioning of individuals (Sahebalzamnai, Farahani, Abasi, & Talebi, 2013). Zoahar and Marshall (2003) used spiritual intelligence to develop “capacity for meaning, vision, and values” (p. 3). Wigglesworth (2012) define spiritual intelligence “as the capacity to behave with wisdom and compassion, while maintaining inner peace regardless of the situation” (p. 7). Spiritual intelligence helps in maintaining harmonious relationships (George, 2006). Therefore, finding the association between spiritual values and spiritual intelligence has a conceptual logic for confirming the convergent validity of the scale.

Objectives

- (1) To confirm the dimensionality of spiritual values scale.
- (2) To find the convergent validity of the scale.
- (3) To find the internal consistency (Cronbach's Alpha) of the scale.

Methodology

Research Design: Quantitative research method was used in this research.

Participants: This study consisted of 300 adolescents from the public schools of Aligarh city, India. The participants were randomly selected by using paper chits for simple random sampling. The age range of participants was from 12 to 19 years, with a mean age of 15.88 (SD=1.84). Those students who agreed to participate were given the consent form and asked to bring the consent signed by themselves and by their parents as well. Those participants, who brought the consent form back to the researcher, participated in the study.

Sample Size Determination: In this study power analysis was used to determine the sample size. The use of power analysis requires knowledge of three things, namely the alpha level adopted in the study, knowledge of the value of power the researcher aims at achieving in the test, and the effect size that is anticipated by the model (Uttley, 2019). In this study the alpha was adopted at the $\alpha = 0.05$ level of significance. Further, the literature shows that while using Confirmatory Factor Analysis, a power of .80 is required for the $\alpha = 0.05$ level associated with RMSEA (Kyriazos, 2018). The minimum sample size was measured by the R code of Preacher and Coffman (2006) that is based on Hancock and Freeman's (2001) interpolation method for computing power and the minimum sample size for RMSEA (Hancock & Freeman, 2001; Hancock & Muller, 2013; Preacher & Coffman, 2006). The formula showed that the minimum sample size required is 200. In the present study the sample size is 300, which was adequate for study. Another rule of thumb for sample size determination in a latent variable model with continuous outcome was suggested by Jackson (2003), that is the N:q ratio. According to this criterion, the sample-size (N) to parameters ratio (q) should be of 20:1 or at least 10:1. So the sample of current study is adequate in size.

Measures

Spiritual Values Scale (SVS): The Spiritual Values Scale developed by Nazam, Husain, and Khan (2015) was used in this study. This scale has 27 spiritual values with a 5 point Likert rating scale ranging from strongly disagree to strongly agree. The scale represents five factors namely, (1) Altruistic Values (8 items) (2) Humanistic Values (7items) (3) Affective Values (3items) (4) Personal Values (7items) and (5) Divine values (2 items). The reliability of the original scale for a normative sample was .91 (Cronbach's Alpha, N=400) (Nazam, Husain, Khan, 2015). For the current sample, the internal consistency of the scale was .908 (Cronbach's Alpha, N=300). The scale showed excellent reliability for the current sample (George & Mallery, 2003). The factorial validity of the scale was calculated by Exploratory factor analysis.

Spiritual Intelligence Self Report Inventory (SISRI): The SISRI developed by King (2008) was used to measure spiritual intelligence. The scale consisted of four factors namely, *Critical Existential Thinking (CET)* (items no. 1, 3, 5, 9, 13, 17, and 21), *Personal Meaning Production (PMP)* (item no. 7, 11, 15, 19, and 23), *Transcendental Awareness (TA)* (2, 6, 10, 14, 18, 20, and 22) and *Conscious State Expansion (CSE)* (4, 8, 12, 16, and 24). There are twenty four items with a five point Likert rating scale ranging from 0–4 where 0 stands for *Not at all true of me*, 1- *Not very true of me*, 2- *Somewhat true of me*, 3- *Very true of me*, and 4- *Completely true of me*. All the items are positively worded, only item number 6 has reverse coding. The participants were asked to rate each statement. The total score on spiritual intelligence was obtained by summing up all the scores on each item. The measure is found to be highly reliable as the internal consistency measured by Cronbach's alpha yielded the value of .920, the split-half reliability was .91 and the test- retest reliability over the period of four months was found to be .89 (King, 2008). Factorial validity was found to be good. For the present study the internal consistency reliability was .79 (Cronbach's Alpha), which is good (George & Mallery, 2003)

Procedure: Before collecting data from the participants, Principals of Schools were approached and the purpose of research was shortly described to them. After seeking their permission the participants were briefed about the research purpose and then consent was taken from them and their parents in order to ensure their willingness to participate in the study. Then the SVS and SISRI along with a personal data sheet containing the demographic details were administered to them. Participants were asked to read the instructions carefully and answer the statements one by one in the required way. They were also told that if they had

any query related to the understanding of items in the scales could feel free to ask for clarification. Once they completed the scale, they were thanked for their active participation in the research. Scoring of measures was done manually.

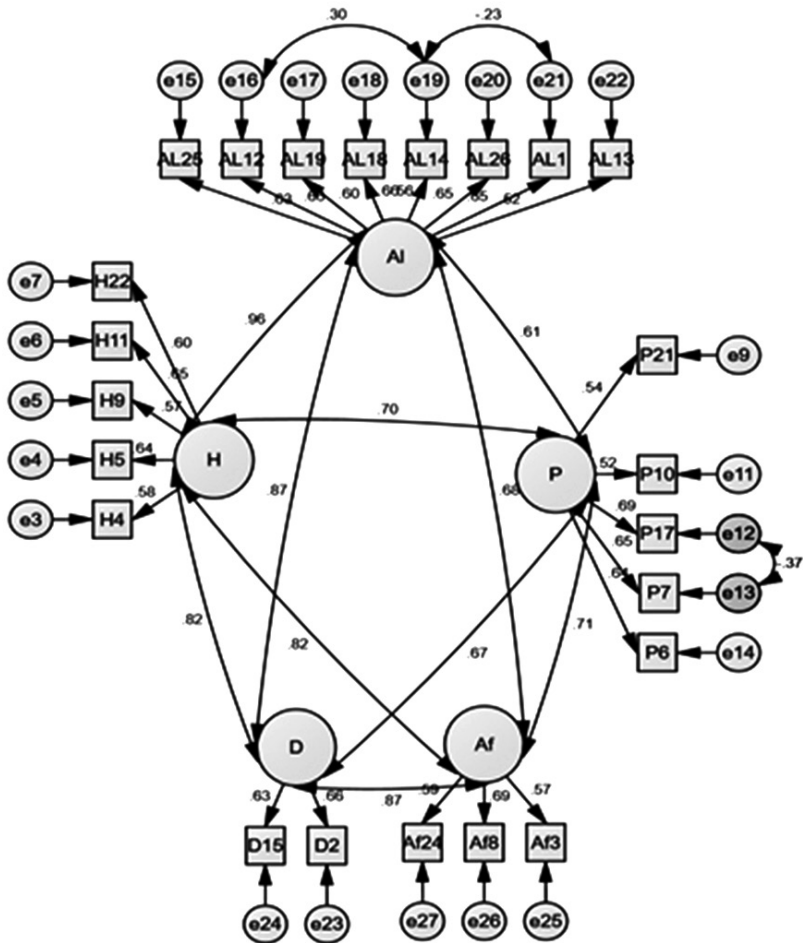


Figure 1. Measurement and Structural model of Spiritual Values Scale

AlV= Altruistic Values, HV= Humanistic Values, PV=Personal Values, AfV= Affective Values, DV= Divine Values

Results

Table 1. Showing Confirmatory Factor Analysis of Spiritual Values Scale and goodness of fit indexes

Model of SVS	χ^2	Df	χ^2/Df	CFI	AGFI	RMSEA	TLI
Model 1	596.567	289	2.06	.880	.844	.060	.865
Model 2	394.709	217	1.45	.921	.875	.052	.908

χ^2 = Chi Square, Df= Degree of Freedom, χ^2/Df = Chi Square/Degree of Freedom, CFI= Comparative Fit Index, AGFI= Adjusted Goodness of Fit Index, RMSEA= Root Mean Square Error of Approximation, TLI= Tucker–Lewis index

Table 2. Showing the Correlation coefficients of Spiritual Values Scale and its factors with Spiritual Intelligence Self Report Inventory and its factors

Spiritual Values Scale	Spiritual Intelligence Scale			
	CET	PMP	TA	CSE
Altruistic Values	.136*	.284**	.380**	.199**
Humanistic Values	.138*	.253**	.353**	.159**
Personal Values	.003	.029	.177**	.195**
Divine Values	.126*	.158**	.263**	.158**
Affective Values	.094	.177**	.248**	.469**
Total			.295**	

CET-Critical Existential Thinking, PMP-Personal Meaning Production, TA-Transcendental Awareness, CSE-Conscious State Expansion

Level of significance: $p < 0.05$ (one tailed)

Table 3. Showing Average Variance Extracted (AVE), Composite reliability of the factors and Internal Consistency of Spiritual Values Scale

Factors	AVE	Composite Reliability
Humanistic Values (Item no. 4,5,9,11,22)	.37	.78
Altruistic Values (1,12, 13,14,18,25,26)	.38	.95
Personal Values (6,7,10,17,21)	.374	.74
Divine Values (2,15)	.416	.50
Affective Value (3,8,24)	.383	.64
Spiritual Values Scale (Total Items=23)	Cronbach's Coefficient Alpha (α) = .908	

Discussion

A structural equation model approach was used to examine the factorial structure of the spiritual values scale. Confirmatory Factor Analysis (CFA) is the measurement technique in the structural equation model which was used to confirm the factorial structure. The standardised factor loading of items was analysed by the standardised factor weight $1 = 0.50$ with the concept that each item will explain 25% variance in the factor. For the first model (Table 1) all the items showed adequate factor loading except item numbers 16, 27, 20, and 23 (Power, Wisdom, Selflessness, and Steadfastness). Also the Modification indices (MI) after application of the Lagrange multiplier test showed covariance between items 7 and 17; 16 and 19; 19 and 21. Resultantly the second model emerged (Table 1). In Model 2 all the items showed adequate standardised factor loading ($1 > 0.50$) and individual reliability ($r^2 = .25$).

In CFA χ^2 measures the goodness of fit of the model to the data. The goal is to reject the null hypothesis. For Model 2 (Table 1) the $\chi^2 = 394.709$, $p < .00$. So apparently it seems that the model does not fit the data. "However, in the case of a large sample, it is normally impossible to fail to reject the null hypothesis" (Kacmar & Carison, 1997, p.653). Further χ^2 is likely to be inflated in a large sample size (Brown, 2006). Therefore while using a large sample the value of χ^2 is divided by degrees of freedom and if the X^2/df ratio is less than 5 the model indicate fit to the data (Wheaton, Muthen, Alwin, & Summer, 1977). For the present study $\chi^2/df = 1.45$ that shows the model fits to the data. In combination of X^2 other indices are used. GFI is another indices for good-of-fit of the model. Model 2 showed a GFI = .902. However for model parsimony the value of AGFI-Adjusted Goodness of Fit Index shall be considered in CFA. The value of the AGFI should exceed .80 (Hooper, et al., 2008; Hu & Bentler, 1999; Kline, 2005). The value for the current model is within the accepted range (AGFI = .875 Model 2). The value of CFI-Comparative fit index shows that proportion of variance and it overcomes the difficulties associated with sample size (Modeskar, Williams, & Holohan, 1994). The value of CFI should be equal or greater than .90 (Hooper, et al., 2008; Kline, 2005; Mulaik, James, Van, Alstine, Bennet, Lind, & Stillwell, 1989; Rigdon, 1996).

Model 2 shows goodness of fit (CFI = .921). Further, the suggested value of RMSEA (Root mean square error of approximation) of < 0.05 (Good), $0.05-0.08$ (Acceptable), and $0.08-0.1$ (Marginal), > 0.1 (Poor) (Fabrigar, McCallum, Wegener, & Strahan, 1999), upper limit of 0.07 (Steiger, 2007). For the current model RMSEA is within the acceptable range (RMSEA = .052). The value of TLI should be greater than .90 (Hooper et al., 2008; Hu & Bentler, 1999; Zainudin, 2012). For

this model it is .908 (Table 1). Hence all the indices of CFA confirm the goodness of fit of the model.

The convergent validity of SVS was determined by two methods. One by correlating the scores of the spiritual values scale with the spiritual intelligence self-report inventory (King, 2008). Another method used was Average Variance Extracted (AVE) in which each factor of the spiritual values scale was taken into consideration. The spiritual values scale has significant positive correlation with the spiritual intelligence self-report inventory ($r = .295, p < 0.01$) (Table 2). All five factors of the spiritual values have positive significant correlation with most of the factors of spiritual intelligence. Although the correlation is weak, but we cannot expect two different constructs to be perfectly correlated for convergent validity.

Secondly, though the AVE is less than .50 (Table 3), if composite reliability is higher than .60, the convergent validity of the scale is still adequate (Fornell & Larcker, 1981). For good convergent validity CR should be ≥ 0.707 (Gefen, Straub, & Boudrean, 2000). Hence the convergent validity of the spiritual values scale is adequate and good. Also the scale has excellent internal consistency reliability (Cronbach's Coefficient Alpha = 0.908, $N = 23$) (George & Mallery, 2003).

Thus the spiritual values scale still stands as a valid and reliable psychological measure for the assessment of values in adolescents. But it is worth noting that the values of selflessness, power, wisdom and steadfastness were not confirmed by the model. Further, the results of this study should be seen as having certain limitations. Although the correlation of spiritual values and spiritual intelligence is positive and significant which fits the theoretical perspective the correlation is weak, ranging from .177 to .469. Therefore, the authors suggest that future researchers should first reconfirm the factorial structure of the Spiritual Intelligence Self Report Inventory in the Indian context and then proceed with correlation analysis. Future research may increase the reliability of the test criterion by following this procedure. Also, the SVS is validated in the Indian culture. However, the practice and preaching of values is subject to cultural change. Therefore, cross cultural validation of this scale is also needed.

Application

This scale can be used for the assessment of values of students. The scores can be used to understand the value system adopted by students and they can then be accordingly assisted by educators. The purpose of education is not only acquisition of knowledge, but also the cultivation of values. Therefore, curriculum design requires both values assessment and value education. The role of teachers in values clarification is very important to help

students make wise choice (Laxmmi, 2009). Spiritual values should be cultivated for the spiritual development of adolescents.

Ethical Consideration

Informed consent was collected from the participants. Further, the study was approved by the Department of Psychology, Aligarh Muslim University, Aligarh. (India). This study was also conducted in accordance to Helsinki (1975) guidelines which were revised in 2000.

Funding

This study did not receive any funding.

Conflict of interest

The author declares no conflict of interest.

Acknowledgment

The authors are thankful to the Principals of Schools for cooperating with the researchers.

References

- Al-Zyoud, M.S.N. (2009). The impact of globalization on Jordan society. *Dirasat, Educational Sciences*, 36(1), 174–184.
- Asghar, M.A., Rathore, F., & Siddiqui, D. (2019). The impact of religious practices and values on academic achievement of students at senior secondary level. *Journal of Education & Practice*, 10(2), 38–43.
- Bagheri, F., Akbarizade, F., & Hatami, H. (2010). The relationship between nurses' spiritual intelligence and happiness in Iran. *Procedia Social Behaviour Sciences*, 5, 1556–1561.
- Brown, T.A. (2006). *Confirmatory factor analysis for applied research*. New York: The Guilford Press.
- Campbell, D.T., & Fiske, W.D. (1959). Convergent and divergent validity by multitrait-multi method matrix. *Psychological Bulletin*, 56, 81–105.
- Cieciuch, J. (2011). Integration of Schwartz's value theory and Scheler's concept of values in research on the development of structures of values during adolescence. *Polish Psychological Bulletin*, 42(4), 205–219.
- Eskin, M. (2013). The effects of individualistic-collectivistic value orientations on nonfatal suicidal behavior and attitudes in Turkish adolescents and young adults. *Scandinavian Journal of Psychology*, 54(6), 493–501.
- Fabrigar, L.R., MacCallum, R.C., Wegener, D.T., & Strahan, E.J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, 4(3), 272–299.
- Gefen, D., Straub, D., & Boudrean, M.C. (2000). Structure equation modelling and regres-

- sion: Guidelines for research practice. *Communication of the Association for Information System*, 4(1), 1–44.
- George, D., & Mallery, P. (2003). Reliability analysis. *SPSS for Windows, step by step: a simple guide and reference* (14th ed.) Boston: Allyn & Bacon, 222–232.
- George, I.N., & Uyanga, D. (2014). Youth and moral values in changing society. *Journal of Humanities & Social Sciences*, 19(6), 40–44.
- George, M. (2006). *Practical application of spiritual intelligence in the workplace*. Emerald Group Publishing Limited, 3–5.
- Goodwin, R., Realo, A., Kwiatkowska, A., Kozlova, A., Nguyen, L.L.A., & Nizharadze, G. (2002). Values and sexual behavior in central and Eastern Europe. *Journal of Health Psychology*, 7, 45–56.
- Gregory, R.J. (2007). *Psychology testing: History, principle, and applications* (5th ed.), Boston: Allyn & Bacon.
- Hancock G.R., & Muller, R.O. (2013). *Structure equation modelling* (2 ed.). Charlotte, NC: Information Age Publishing.
- Hancock, G. R., & Freeman, M.J. (2001) Power and sample size for the RMSEA test of not close fit in structural equation modeling. *Educational & Psychological Measurement*, 61, 741–758.
- Hofer, M., Schmid, S., Fries, S., Zivkovic, I., & Dietz, F. (2009). Value orientations and studying in school–leisure conflict: A study with samples from five countries. *Learning and Individual Differences*, 19(1), 101–112.
- Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural Equation Modelling: Guidelines for determining model fit. *Dublin Institute of Technology Articles*, 6(1), 53–60.
- Hu, L.T., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55.
- Husain, A., Zehra, S., & Jahan, M. (2015). Standardization of employees spiritual values scale (ESVS). *Indian Journal of Positive Psychology*, 6(3), 321–322.
- Kacmar, K.M., & Carsion, D.S. (1997). Further validation of the perception of politics scale (POPS): A multiple sample investigation. *Journal of Management*, 23(5), 627–658.
- King, D.B. (2008). Rethinking claims of spiritual intelligence: A definition, model, and measure. Unpublished master thesis. Ontario, Canada: Trent University.
- Kline, R.B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York: Guilford Press.
- Knafo, A., Daniel, E., & KhouryKassabri, M. (2008). Values as protective factors against violent behavior in Jewish and Arab high schools in Israel. *Child Development*, 79(3), 652–667.
- Koscielniak, M., & Bojanowska, A. (2019). The role personal values and student achievement in academic dishonesty. *Frontiers in Psychology*, 10, 1–7.
- Kyriazos, J. (2018). Applied psychometrics: Sample size and sample power considerations in factor analysis (EFA, CFA) and SEM in general. *Psychology*, 9, 2207–2230.

- Larcker, D.F. (1981). Evaluating structure equation model with unobservable variable and measurement error. *Journal of Marketing Research*, 18(1), 39–50.
- Laxmi, C. (2009). Value education: An Indian perspective on the need of moral education in a time of rapid social change. *Journal of College & Character*, 10(3), 1–7.
- Medsker, G.J., Williams, L.J., & Holoan, P.J. (1994). A review of current practices for evaluating causal models in organizational behavior and human resources management research. *Journal of Management*, 20, 439–464.
- Nazam, F., Husain, A., Khan, S.M. (2015). *Manual of Spiritual Values Scale*. India, Agra :National Psychological Corporation.
- Nisha, C., Anjali, M., & Sarita, S. (2016). A study on the impact of values on career decision making of adolescents. *International Journal of Research in Applied Science & Engineering Technology*, 4(10), 395–398.
- Preacher, K.J., & Coffman, D.L. (2006). Computing power and minimum sample size for RMSEA [Computer software]. Available from <http://quantpsy.org/>
- Rigdon, E.E. (1996). CFI versus RMSEA: A comparison of two fit indexes for structural equation modeling. *Structural Equation Modeling: A Multidisciplinary Journal*, 3(4), 369–379.
- Sahebalzamnai, M., Farahani, H., Abasi, R., & Talebi, M. (2013). The relationship between spiritual intelligence with psychological well-being. *Iranian Journal of Nursing & Midwifery Research*, 18(1), 38–41.
- Steiger, J.H. (2007). Understanding the limitations of global fit assessment in structural equation modelling. *Personality and Individual Differences*, 42(5), 893–98.
- Taneri, P.O., Gao, S.J., & Johnson, S.R. (2016). Reasons for the deterioration of moral values: Cross cultural comparative analysis. International Academic Conference Proceedings. Boston, USA.
- Tarabashkina, L., & Lietz, P. (2011). The impact of values and learning approaches and academic discipline influences. *Issues in Educational Research*, 21(2), 210–216.
- Uttley, J. (2019). Power analysis, sample size, and assessment of statistical assumptions—Improving the evidential value of lighting research. *LEUKOS*, 15(2), 143–162.
- Wei, Z., Zhao, Z., & Zheng, Y. (2016). Moderating effect of social value orientation on the effect of social influence in prosocial decisions. *Frontiers in Psychology*, 7, 1–9.
- Wheaton, B.B., Muthen, B., Alwin, D.F., & Summers, G.F. (1977). Assessing reliability and stability in panel models. In D.R. Heise (Ed.). *Sociological Methodology*. San Francisco: Jossey-Bass.
- Wigglesworth, C. (2012). SQ21: The 21 skills of spiritual intelligence. New York: Selected Books.
- ZainudinHjAwang. (2012). *Structural Equation Modelling Using AMOS Graphic*. Kuala Lumpur: UiTM Press.
- Zohar, D., & Marshall, I. (2000). *SQ—Spiritual intelligence, the ultimate intelligence*. London: UL copy.

*Abdul Muhid, Ahmad Yusuf,
Kusaeri,
Dian Candra Rini Novitasari,
Ahmad Hanif Asyhar*
Indonesia

Ali Ridho
Indonesia

Determining Scholastic Aptitude Test as Predictors of Academic Achievement on Students of Islamic School in Indonesia

DOI: 10.15804/tner.2020.61.3.17

Abstract

Selection of new students is based on student potential. Research on the potential of the cognitive abilities and records of Islamic school students' academic achievement in Indonesia are still very rare. This paper presents empirical data about the predictive ability of a test of scholastic ability for the academic achievement of Islamic school students in Indonesia. This research used a quantitative approach with a survey method that used the Ministry of Religious Affair (MORA)'s Scholastic Aptitude Test (SAT) and Students' scores on 5 subjects in the first semester. The subjects of this study were 9609 Islamic school students selected using a quota sampling technique that represented Islamic schools in Indonesia. The results of this study indicate that all of the SAT subsets, those are verbal, numerical, analytical and spatial, are significant predictors of academic achievement of Islamic school students in Indonesia. The empirical analytical sub-test is the strongest predictor of Islamic school students' academic scores. While, the analytical sub-test has very significant correlation with the academic score on Islamic Studies subjects. Meanwhile the verbal sub-test has a very strong relationship with academic achievement in Arabic and English subjects, the numerical sub-test very strongly relates to academic achievement in science and mathematics subjects. Among the four SAT subtests, the spatial sub-test had the lowest correlation with all subjects

Key words: *academic achievement, cognitive abilities, predictor, scholastic aptitude test*

Introduction

The purpose of selecting new students is to select students who are ready and have the potential to do academic assignments. Through the process of selecting new students, information will be obtained about factors that affect student academic performance (Thiele et al., 2016). Researchers and educational practitioners pay attention to initial competence and about the potential of new students in order to predict academic success. As a result, curriculum and learning material can be developed to improve students' academic performance (O'Connor & Paunonen, 2007).

Until now, it is still rare to find research on initial information about the potential of Islamic school students in Indonesia. Theoretically, the facts show that cognitive potential is very important for student academic performance (Komarraju et al., 2013). In addition, cognitive ability can be a predictor of student academic achievement (Veas et al., 2015). According to Barreiro (2014) cognitive ability is a very significant predictor of student academic performance. Bazelais et al., 2016 show that students' cognitive abilities are very significant predictors for academic performance and academic success. Likewise, Brandt et al., 2019 state that cognitive ability is a predictive variable in mathematics learning achievement.

Previous studies have shown that students' cognitive abilities are significant predictive variables that influence their academic performance (Rajalaxmi et al., 2019). Pedaste et al., 2015 assume that cognitive abilities are related to intrinsic motivation and are able to predict students' academic performance. According to Mandelman et al., 2016, tests of cognitive ability such as analytical, practical, and creative cognitive abilities are able to predict the academic achievements of students. Similarly, according to Demetriou et al., 2020, cognitive abilities such as mathematical, causal, spatial, and social reasoning become predictive variables that are very significant in school performance, especially mathematics, science, and language. This finding correlates with previous research which shows that cognitive abilities such as inductive, deductive, quantitative, causal, and spatial skills are predictors of school performance in mathematics, science, and language (Demetriou et al., 2019). In addition, Chong & Yeo (2016) claim that cognitive abilities such as critical thinking, creative thinking, and metacognition significantly predict academic performance.

Many researchers measure cognitive abilities with the SAT. Cognitive abilities such as those measured on standardised tests like the SAT have a high predictive validity for academic achievement (Sulphey et al., 2018), Duckworth et al., 2019 also found the SAT to be a predictor of student academic achievement. In addition, Ana-

zia, 2019 found that the Quantitative Aptitude Test and the Verbal Aptitude Test are very significant predictors for academic performance in secondary school students.

There is little research, if any, on the potential cognitive abilities and personality among students of religious program of Islamic schools in Indonesia such as Muhid et al., 2020. Therefore, we need empirical data to demonstrate whether the SAT is able to predict academic achievement specifically for Islamic school students in Indonesia. This article aims to describe the findings of empirical studies on the four subtests of the SAT, namely whether the verbal, numerical, analytical, and spatial tests both together and individually function as predictive variables that relate to the academic achievement of Islamic school students in Indonesia, particularly in Islamic Studies, Arabic, English, science, and mathematics.

Methodology of Research

General Background of Research

This research used a quantitative approach with a correlation causality design. The survey method was used to collect data by distributing instruments to participants.

Quota sampling was used to select participants, who were 9609 research subjects from Islamic school students around Indonesia, 4492 state Islamic School students and 5117 private Islamic school students.

Instrument

This study used scores on five of the subjects in the Islamic school: Islamic Studies, Arabic, English, science, and mathematics. The academic / learning achievement test was developed by the national team for question compilation from the Ministry of Religious Affairs of Indonesia (MORA) assessment team. Whereas, to measure SAT the MORA's Scholastic Aptitude Test (MORA-SAT) which consisted of four subtests- verbal, numerical, analytical, and spatial was used .

Data Analysis

Multiple linear regression was used to analyze the data. The stepwise technique was used to analyze the relationship between each sub-test of the SAT and the academic achievement of the Islamic school students. The data was analysed using IBM SPSS Version 25. Data analysis results consist of multiple correlation coefficients (r), coefficients of determination (r^2), F-ratios (F), p-values (P), Subtest coefficients (B) and t-values (T).

Results of Research

The results of the statistical analysis show that there is a simultaneous relationship between all the SAT subtests; verbal, numerical, analytical, and spatial and the academic achievement of Islamic school students ($r = .689$; $r^2 = .474$; $F = 216.603$; $P = .000$). The four SAT subtests are significant predictive variable for the academic achievement of Islamic school students. Table 1 shows that the four SAT subtests; verbal, numerical, analytical, and spatial have a significant positive relationship with the academic achievement of Islamic school students. The analytical sub-test was the strongest predictor of academic achievement in Islamic school students.

Table 1. The Relationship between Each Subtest of SAT and Academic Achievement

Subtest SAT	B	T	P
Verbal	.795	26.803	.000
Numerical	.691	24.718	.000
Analytical	.876	29.015	.000
Spatial	.575	17.096	.000

The results of the statistical analysis show that all of the SAT subtests; verbal, numerical, analytical, and spatial are related to the achievement in Islamic Studies subjects in Islamic school students ($r = .389$; $r^2 = .151$; $F = 426,939$; $P = .000$). Similarly, all the four SAT subtests are significant predictive variables for achievement in Islamic Studies subjects in Islamic school students. Table 2 shows that the four subtests of the SAT have a significant positive relationship with the achievement in Islamic Studies subjects in Islamic school students. The verbal and analytical subtest had the strongest correlation as predictors of achievement in Islamic Studies subjects in Islamic school students.

Table 2. The Influence of Each Subtest SAT on Islamic Studies Achievement

Subtest SAT	B	T	P
Verbal	.191	16.832	.000
Numerical	.081	7.604	.000
Analytical	.130	11.202	.000
Spatial	.107	8.340	.000

The results of the statistical analysis show that all the SAT subtests; verbal, numerical, analytical, and spatial skills relate to achievement in Arabic in Islamic

school students ($r = .202$; $r^2 = .041$; $F = 101,874$; $P = .000$). The four subtests of the SAT are significant predictive variables for achievement in Arabic in Islamic school students. Table 3 shows that the four subtests of the SAT have a significant relationship with the achievement in Arabic in Islamic school students. The verbal sub-test is the strongest predictor of achievement in Arabic in Islamic school students.

Table 3. The Relationship between Each Subtest on SAT and Achievement in Arabic

Subtest SAT	B	T	P
Verbal	.119	8.533	.000
Numerical	.055	4.185	.000
Analytical	.076	5.348	.000
Spatial	.053	3.344	.000

Results of the statistical analysis show that all of the SAT sub-tests verbal, numerical, analytical, and spatial correlate with achievement in English in Islamic school students ($r = .625$; $r^2 = .390$; $F = 153.603$; $P = .000$). All the SAT sub-tests are significant predictive variables for the achievement of Islamic school students in English. Table 4 shows that the four sub-tests of SAT have a significant relationship with the achievement of Islamic school students in English. The verbal and analytical subtests were the strongest predictors of Islamic school students' achievement in English.

Table 4. The Relationship of Each Subtest on SAT and Achievement in English

Subtest SAT	B	T	P
Verbal	.210	24.021	.000
Numerical	.140	16.981	.000
Analytical	.231	25.953	.000
Spatial	.153	15.493	.000

Results of the statistical analysis show that all of the SAT sub-tests verbal, numerical, analytical, and spatial correlate with the Islamic school students' achievement in science ($r = .562$; $r^2 = .316$; $F = 111.103$; $P = .000$). All the SAT sub-tests function as significant predictive variables for achievement in science in Islamic school students. Table 5 shows that the four sub-tests of SAT have a significant relationship with the achievement in science in Islamic school students. The

numerical and analytical subtests were the strongest predictors of Islamic school students' achievement in science.

Table 5. The Relationship between Each Subtest on SAT and Achievement in Science

Subtest SAT	B	T	P
Verbal	.163	17.371	.000
Numerical	.172	19.491	.000
Analytical	.187	19.594	.000
Spatial	.142	13.345	.000

The results of the statistical analysis show that all the SAT sub-tests verbal, numerical, analytical, and spatial correlate with achievement in mathematics in the Islamic school students ($r = .631$; $r^2 = .398$; $F = 158.903$; $P = .000$). All the SAT sub-tests are significant predictive variables for achievement in mathematics in Islamic school students. Table 6 shows that the four sub-tests SAT have a significant relationship with mathematics achievement in Islamic school students. The numerical and analytical subtests are the most significant predictors of achievement in mathematics in Islamic school students.

Table 6. The Relationship between Each Subtest SAT and Achievement in Mathematics

Subtest SAT	B	T	P
Verbal	.112	12.459	.000
Numerical	.243	28.525	.000
Analytical	.253	27.558	.000
Spatial	.120	11.688	.000

Discussion

The results of this study show that all the sub-tests (verbal, numerical, analytical and spatial skills) of the Scholastic Aptitude Test (SAT), are significant predictors of academic achievement of Islamic school students in Indonesia. The result of this study is in accordance with previous studies which stated that SAT scores were the most significant predictors of student academic achievement (Hall et al., 2015).

Moreover, this study confirms that among the four SAT subtests, the analytical sub-test is the most significant predictor of Islamic school student academic achievement. Empirical analytical reasoning subtests have a very strong relation with student academic achievement. The finding of this study is in line with the research conducted by Rani, 2017 which assumes that there is a significant relationship between reasoning ability and academic achievement of secondary school students. Williamson III & Anderson, 2019 explain that reasoning ability is a predictor of student academic success. Reasoning ability is a problem-solving analysis capability that is very important in academic success (Barlow-Jones & van der Westhuizen, 2017). Research by Wang et al., 2020 also supports the results of this study that reasoning ability is the main predictor of student academic achievement.

Analytical reasoning ability has a significant relationship with academic achievement in all subjects such as Islamic Studies, English, mathematics and science. Abbasi & Izadpanah, 2018 also found that reasoning ability is a significant predictor of academic achievement in English. Similarly, Maiti, 2017, Schaap and Luwes, 2013, showed that reasoning ability relates to achievement in mathematics. Septia et al., 2019 showed that reasoning ability is related to mathematical ability, while Payadnya, 2019 showed that reasoning ability is related to mathematical problem-solving abilities. Dumas & Schmidt, 2015 found that reasoning ability is a predictor of academic achievement in science.

The verbal subtest was found to have a significant relationship with Arabic and English. Verbal test results are significant predictors of first-year academic achievement (Heeren et al., 2020). Similarly, Van Eeden et al., 2001, found that the verbal test is the best psychometric predictor of academic achievement. According to Aksamovic et al., 2019, verbal ability is significantly related to student academic achievement. Moreover, Farran et al., 2016 argue that verbal ability is a predictor of Arabic and English language abilities. Meanwhile, according to Ogunyemi et al., 2018, verbal ability is a significant predictor of students' language competence. In the same way, Andrew et al., 2005 found that verbal ability is a significant predictor of language ability which is related to effectiveness in language learning.

Numerical subtests are empirically effective predictors of academic achievement in science and mathematics subjects. This finding is in accordance with Aderogba & Olatoye, 2011 who show that numerical ability in an aptitude test is a predictor of achievement in science subjects. Similarly, Badru (2016) states that numerical ability is a determinant factor in the mathematics achievement of high school students. Again, Memisevic et al., 2018 confirms that numerical ability is a predictor of mathematical achievement. In addition, the numerical test is a predictor

of academic success in arithmetic (Lyons et al., 2014). Likewise, Desoete et al., 2009 conclude that numerical ability is a longitudinal predictor of achievement in arithmetic.

In short, this research confirms that cognitive ability as measured in standardized tests is a very strong predictor of student academic achievement. Cognitive ability tests are highly recommended by many researchers. Ciarrochi & Heaven, 2012 and Srimaharaj et al., 2020 show that cognitive abilities such as verbal, numerical, analytical, and spatial skills are predictors of students' academic achievement.

Conclusions

Based on the explanation above, it can be concluded that all of the SAT subtests verbal, numerical, analytical and spatial skills are significant predictors of the academic achievement of Islamic school students in Indonesia. The empirical analytical subtest is the most significant predictor of Islamic school student academic achievement. In particular, the analytical sub-test has a very significant correlation with academic achievement in Islamic Studies, whereas the verbal sub-test has a very significant relationship with academic achievement in Arabic and English. The numerical sub-test was found to correlate very significantly with academic achievement in science and mathematics. Among the four SAT subtests, the spatial sub-test had the weakest relation to all the subjects. With the results of this study, it is expected that educators and researchers will pay more attention to students' scholastic ability as the basis for selecting new students.

Acknowledgements

We thank the Ministry of Religious Affairs (MORA), especially the Directorate of Curriculum, Facilities, and Institutions; Students of Madrasahs that provided the data for this research and UIN Sunan Ampel Surabaya.

References

- Abbasi, A., & Izadpanah, S. (2018). The Relationship Between Critical Thinking, its Subscales and Academic Achievement of English Language Course: The Predictability of Educational Success Based on Critical Thinking. *Academy Journal of Educational Sciences*, 2(2), 91–105.
- Aderogba, A.A., & Olatoye, R.A. (2011). Performance of senior secondary school science

- students in aptitude test: The role of student verbal and numerical abilities. *Journal of Emerging Trends in Educational Research and Policy Studies*, 2(6), 431–435.
- Aksamovic, A., Djordjevic, M., Malec, D., & Memisevic, H. (2019). Relationship Between The Verbal Fluency And Academic Achievement In Second And Third Grade Students: The Effects Of Gender And Parents' educational Level. *Acta Neuropsychologica*, 17(2).
- Anazia, I.U. (2019). Quantitative and Verbal Aptitudes as Predictors of Senior Secondary School Students' Performance in Economics. *IAFOR Journal of Education*, 7(1), 7–18.
- Andrew, M.D., Cobb, C.D., & Giampietro, P.J. (2005). Verbal ability and teacher effectiveness. *Journal of Teacher Education*, 56(4), 343–354.
- Barlow-Jones, G., & van der Westhuizen, D. (2017). Problem solving as a predictor of programming performance. *Annual Conference of the Southern African Computer Lecturers' Association*, 209–216.
- Barreiro, O.M. (2014). *Cognitive ability, thinking styles, emotional intelligence, and their impact on academic performance*. Unpublished doctoral dissertation, Walden University.
- Bazelais, P., Lemay, D.J., & Doleck, T. (2016). How Does Grit Impact College Students' Academic Achievement in Science?. *European Journal of Science and Mathematics Education*, 4(1), 33–43.
- Brandt, N.D., Lechner, C.M., Tetzner, J., & Rammstedt, B. (2019). Personality, cognitive ability, and academic performance: Differential associations across school subjects and school tracks. *Journal of Personality* 88(2), 249–265.
- Chong, Y.L., & Yeo, K.J. (2016). Cognitive ability and academic achievement of undergraduates. *Man in India*, 96(6), 1777–1786.
- Ciarrochi, J., & Heaven, P.C.L. (2012). Religious values and the development of trait hope and self-esteem in adolescents. *Journal for the Scientific Study of Religion*, 51(4), 676–688.
- Demetriou, A., Kazi, S., Makris, N., & Spanoudis, G. (2020). Cognitive ability, cognitive self-awareness, and school performance: From childhood to adolescence. *Intelligence*, 79, Article 101432.
- Demetriou, A., Kazi, S., Spanoudis, G., & Makris, N. (2019). Predicting school performance from cognitive ability, self-representation, and personality from primary school to senior high school. *Intelligence*, 76, Article 101381.
- Desoete, A., Stock, P., Schepens, A., Baeyens, D., & Roeyers, H. (2009). Classification, seriation, and counting in grades 1, 2, and 3 as two-year longitudinal predictors for low achieving in numerical facility and arithmetical achievement? *Journal of Psychoeducational Assessment*, 27(3), 252–264.
- Duckworth, A.L., Quirk, A., Gallop, R., Hoyle, R.H., Kelly, D.R., & Matthews, M.D. (2019). Cognitive and noncognitive predictors of success. *Proceedings of the National Academy of Sciences*, 116(47), 23499–23504.
- Dumas, D., & Schmidt, L. (2015). Relational reasoning as predictor for engineering ideation success using TRIZ. *Journal of Engineering Design*, 26(1–3), 74–88.
- Farran, L.K., Bingham, G., & Matthews, M. (2016). Language Predictors of Word Reading in Bilingual English-Arabic Children. *Arab Journal of Applied Linguistics*, 2(1), 91–116.
- Hall, C.W., Kauffmann, P.J., Wuensch, K.L., Swart, W.E., DeUrquidí, K.A., Griffin, O.H.,

- & Duncan, C.S. (2015). Aptitude and personality traits in retention of engineering students. *Journal of Engineering Education*, 104(2), 167–188.
- Heeren, J., Speelman, D., & De Wachter, L. (2020). A practical academic reading and vocabulary screening test as a predictor of achievement in first-year university students: Implications for test purpose and use. *International Journal of Bilingual Education and Bilingualism*, 1–16.
- Komaraju, M., Ramsey, A., & Rinella, V. (2013). Cognitive and non-cognitive predictors of college readiness and performance: Role of academic discipline. *Learning and Individual Differences*, 24, 103–109. <https://doi.org/10.1016/j.lindif.2012.12.007>
- Lyons, I.M., Price, G.R., Vaessen, A., Blomert, L., & Ansari, D. (2014). Numerical predictors of arithmetic success in grades 1–6. *Developmental Science*, 17(5), 714–726.
- Maiti, S. (2017). Impact of reasoning ability on mathematics achievement. *International Journal of Research and Scientific Innovation IV(VI)*, 111–113.
- Mandelman, S.D., Barbot, B., & Grigorenko, E.L. (2016). Predicting academic performance and trajectories from a measure of successful intelligence. *Learning and Individual Differences*, 51, 387–393.
- Memisevic, H., Biscevic, I., & Pasalic, A. (2018). Predictors Of Math Achievement In Elementary School Students Grades 1–3. *Acta Neuropsychologica*, 16(3).
- Muhid, A., Kurjum, M., Thohir, M., Ridho, A., Yusuf, A., Suryani, S., & Asyhar, A.H. (2020). Cognitive and personality test as a predictor of religious education achievement among students of religious program of Islamic schools in Indonesia. *Elementary Education Online*, 19(4), 2408–2418.
- O'Connor, M.C., & Paunonen, S.V. (2007). Big Five personality predictors of post-secondary academic performance. *Personality and Individual Differences*, 43(5), 971–990. <https://doi.org/10.1016/j.paid.2007.03.017>
- Ogunyemi, K.O., Akoko, A., State, O., Adebowale, E.O., Akoko, A., & State, O. (2018). Verbal Ability and Grammatical Competence as Determinants of Secondary School Students' Writing Competence. *International Journal of Scientific Research in Education* 11(3B), 521–528.
- Payadnya, I. (2019). Investigation of students' mathematical reasoning ability in solving open-ended problems. *Journal of Physics: Conference Series*, 1200(1), 12016.
- Pedaste, M., Must, O., Silm, G., Täht, K., Kori, K., Leijen, Ä., & Mägi, M.-L. (2015). How do cognitive ability and study motivation predict the academic performance of IT students? *ICERI Conference*.
- Rajalaxmi, R.R., Natesan, P., Krishnamoorthy, N., & Ponni, S. (2019). Regression Model for Predicting Engineering Students Academic Performance. *International Journal of Recent Technology and Engineering* 7(6S3), 71–75
- Rani, K.V. (2017). Reasoning Ability and Academic Achievement among Secondary School Students in Trivandrum. *Journal on School Educational Technology*, 13(2), 20–30.
- Schaap, P., & Luwes, M. (2013). Learning potential and academic literacy tests as predictors of academic performance for engineering students. *Acta Academica*, 45(3), 181–214.
- Septia, T., Yuwono, I., Parta, I.N., & Susanto, H. (2019). Spatial reasoning ability of mathematics college students. *Journal of Physics: Conference Series*, 1188(1), 12102.

- Srimaharaj, W., Chaising, S., Sittiprapaporn, P., Temdee, P., & Chaisricharoen, R. (2020). Effective Method for Identifying Student Learning Ability During Classroom Focused on Cognitive Performance. *Wireless Personal Communications*, 1–18.
- Sulphey, M.M., Al-Kahtani, N.S., & Syed, A.M. (2018). Relationship between admission grades and academic achievement. *Journal of Entrepreneurship and Sustainability Issues* 5(3):648–658
- Thiele, T., Singleton, A., Pope, D., & Stanistreet, D. (2016). Predicting students' academic performance based on school and socio-demographic characteristics. *Studies in Higher Education*, 41(8), 1424–1446.
- Van Eeden, R., De Beer, M., & Coetzee, C.H. (2001). Cognitive ability, learning potential, and personality traits as predictors of academic achievement by engineering and other science and technology students. *South African Journal of Higher Education*, 15(1), 171–179.
- Veas, A., Castejón, J.-L., Gilar, R., & Miñano, P. (2015). Academic achievement in early adolescence: The influence of cognitive and non-cognitive variables. *The Journal of General Psychology*, 142(4), 273–294.
- Wang, D., Yuan, F., & Wang, Y. (2020). Growth mindset and academic achievement in Chinese adolescents: A moderated mediation model of reasoning ability and self-affirmation. *Current Psychology*, 1–10.
- Williamson III, K.C., & Anderson, A.J. (2019). Reasoning ability as a predictor of success in a construction surveying course. *International Journal of Construction Education and Research*, 15(1), 42–61.

