



(AJE)

# The Athens Journal of Education



(AJE)

Volume 8, Issue 4, November 2021

## Articles

### Front Pages

LEIV OPSTAD

[Can Multiple-Choice Questions Replace Constructed Response Test as an Exam Form in Business Courses? Evidence from a Business School](#)

DEMET DENİZ YILMAZ & BETÜL KÜÇÜK DEMİR

[Mathematics Teachers' Pedagogical Content Knowledge Involving the Relationships between Perimeter and Area](#)

ÖZLEM ALTINDAĞ KUMAŞ & CEVRIYE ERGÜL

[Effectiveness of the Big Math for Little Kids Program on the Early Mathematics Skills of Children with Risk Group](#)

BETÜL KÜÇÜK DEMİR

[The Opinions of Mathematics Teacher Candidates Who Have Received a STEM Training on STEM and the Activities they Designed in the Class](#)

CEYLAN ŞEN, ZEYNEP SONAY AY & GÜRSEL GÜLER

[The Effectiveness of Inquiry-based Learning on Middle School Students' Mathematics Reasoning Skill](#)



**ATHENS INSTITUTE FOR EDUCATION AND RESEARCH**

*A World Association of Academics and Researchers*

*8 Valaoritou Str., Kolonaki, 10671 Athens, Greece.*

*Tel.: 210-36.34.210 Fax: 210-36.34.209*

*Email: [info@atiner.gr](mailto:info@atiner.gr) URL: [www.atiner.gr](http://www.atiner.gr)*

**Established in 1995**



(ATINER)

(ATINER)

## Mission

ATINER is an Athens-based World Association of Academics and Researchers based in Athens. ATINER is an independent and non-profit **Association** with a **Mission** to become a forum where Academics and Researchers from all over the world can meet in Athens, exchange ideas on their research and discuss future developments in their disciplines, **as well as engage with professionals from other fields**. Athens was chosen because of its long history of academic gatherings, which go back thousands of years to *Plato's Academy* and *Aristotle's Lyceum*. Both these historic places are within walking distance from ATINER's downtown offices. Since antiquity, Athens was an open city. In the words of Pericles, ***Athens" ... is open to the world, we never expel a foreigner from learning or seeing"***. ("Pericles' Funeral Oration", in Thucydides, *The History of the Peloponnesian War*). It is ATINER's **mission** to revive the glory of Ancient Athens by inviting the World Academic Community to the city, to learn from each other in an environment of freedom and respect for other people's opinions and beliefs. After all, the free expression of one's opinion formed the basis for the development of democracy, and Athens was its cradle. As it turned out, the Golden Age of Athens was in fact, the Golden Age of the Western Civilization. *Education* and *(Re)searching* for the 'truth' are the pillars of any free (democratic) society. This is the reason why *Education* and *Research* are the two core words in ATINER's name.

# The Athens Journal of Education

ISSN NUMBER: 2241-7958 - DOI: 10.30958/aje

ISSN (print): 2407-9898

Volume 8, Issue 4, November 2021

Download the entire issue ([PDF](#))

**Front Pages** i-viii

**Can Multiple-Choice Questions Replace Constructed Response Test as an Exam Form in Business Courses? Evidence from a Business School** 349

*Leiv Opstad*

**Mathematics Teachers' Pedagogical Content Knowledge Involving the Relationships between Perimeter and Area** 361

*Demet Deniz Yilmaz & Betül Küçük Demir*

**Effectiveness of the Big Math for Little Kids Program on the Early Mathematics Skills of Children with Risk Group** 385

*Özlem Altındağ Kumaş & Cevriye Ergül*

**The Opinions of Mathematics Teacher Candidates Who Have Received a STEM Training on STEM and the Activities they Designed in the Class** 401

*Betül Küçük Demir*

**The Effectiveness of Inquiry-based Learning on Middle School Students' Mathematics Reasoning Skill** 417

*Ceylan Şen, Zeynep Sonay AY & Gürsel Güler*

# Athens Journal of Education

## Editorial and Reviewers' Board

### Editors

- **Dr. John Spiridakis**, Academic Member, ATINER & Professor, St. John University, USA.
- **Dr. Alexander Makedon**, Head, [Education Unit](#), ATINER.
- **Dr. Julia Underwood**, Academic Member, ATINER & Professor, Azusa Pacific University, USA.
- **Dr. Zoi Philippakos**, Academic Member, ATINER & Assistant Professor, University of Tennessee, Knoxville, USA.

### Editorial Board

- Dr. Sharon Vaughn, Academic Member, ATINER & Professor and Executive Director, The University of Texas at Austin and The Meadows Center for Preventing Educational Risk, USA.
- Dr. Effie Kritikos, Academic Member, ATINER & Professor and Division Chair of Education, Governors State University, USA.
- Dr. Elsa Fourie, Academic Member, ATINER & Professor & Director, North-West University, South Africa.
- Dr. Effie Efthymiou, Academic Member, ATINER & Assistant Professor, United Arab Emirates University (UAEU), UAE.
- Dr. Ashlea Rineer-Hershey, Assistant Professor and Education Transition Programming Coordinator, Slippery Rock University, USA.
- Dr. Lorna Hamilton, Academic Member, ATINER & Senior Lecturer, School of Education University of Edinburgh, UK.
- Dr. Yaacov Julian Katz, Academic Member, ATINER & Lecturer and Researcher in Social Psychology of Education, Bar-Ilan University, Israel.
- Dr. Mary Ellis, Academic Member, ATINER & Senior Lecturer, National Institute of Education (Nanyang Technological University), Singapore.
- Dr. Sandra M. Harris, Academic Member, ATINER & Assessment Director, Walden University, USA.
- Dr. Jose Francisco Duran Medina, Professor, Department of Pedagogy, University of Castilla-La Mancha, Spain.
- Dr. Roger B. Hill, Professor, University of Georgia, USA.
- Dr. Azita Manouchehri, Professor, Ohio State University, USA.
- Dr. Macleans A. Geo-Jaja, Professor of Economics and Education, David O. McKay School of Education, Brigham Young University, USA.
- Dr. Dijana Karuovic, Professor, Technical Faculty "Mihajlo Pupin" Zrenjanin, Serbia.
- Dr. Mohinder Partap Satija, Professor, Guru Nanak Dev University, India.
- Dr. Aieman Ahmad Al-Omari, Professor, The Hashemite University, Jordan.
- Dr. Michael F. Shaughnessy, Professor, School of Education, Eastern New Mexico University, USA.
- Dr. Trish Stoddart, Professor, Education Department, University of California, USA.
- Dr. Kamini Jaipal Jamani, Associate Professor, Brock University, Canada.
- Dr. Francisco Javier Fernandez Rio, Associate Professor, Educational Sciences Department, University of Oviedo, Spain.

- **General Managing Editor of all ATINER's Publications:** Ms. Afrodete Papanikou
- **ICT Managing Editor of all ATINER's Publications:** Mr. Kostas Spyropoulos
- **Managing Editor of this Journal:** Dr. Aleksandra Tryniecka ([bio](#))

### **Reviewers' Board**

[Click Here](#)

# President's Message

All ATINER's publications including its e-journals are open access without any costs (submission, processing, publishing, open access paid by authors, open access paid by readers etc.) and is independent of presentations at any of the many small events (conferences, symposiums, forums, colloquiums, courses, roundtable discussions) organized by ATINER throughout the year and entail significant costs of participating. The intellectual property rights of the submitting papers remain with the author. Before you submit, please make sure your paper meets the [basic academic standards](#), which includes proper English. Some articles will be selected from the numerous papers that have been presented at the various annual international academic conferences organized by the different divisions and units of the Athens Institute for Education and Research. The plethora of papers presented every year will enable the editorial board of each journal to select the best, and in so doing produce a top-quality academic journal. In addition to papers presented, ATINER will encourage the independent submission of papers to be evaluated for publication.

The current issue is the fourth of the eighth volume of the *Athens Journal of Education (AJE)*, published by the [Education Unit](#) of ATINER.

Gregory T. Papanikos  
President  
ATINER



## Athens Institute for Education and Research *A World Association of Academics and Researchers*

### 24<sup>th</sup> Annual International Conference on Education 16-19 May 2022, Athens, Greece

The [Education Unit](#) of ATINER organizes its 24<sup>th</sup> Annual International Conference on Education, 16-19 May 2022, Athens, Greece sponsored by the [Athens Journal of Education](#). The aim of the conference is to bring together scholars and students of education and other related disciplines. You may participate as stream leader, presenter of one paper, chair a session or observer. Papers (in English) from all areas of education are welcome. Please submit a proposal using the form available (<https://www.atiner.gr/2022/FORM-EDU.doc>).

### Academic Members Responsible for the Conference

- **Dr. Gregory T. Papanikos**, President, ATINER.
- **Dr. David Philip Wick**, Director, [Arts, Humanities and Education Division](#), ATINER & Professor of History, Gordon College, USA.
- **Dr. John Spiridakis**, Co-Editor, Athens Journal of Education & Professor, St. John University, USA.
- **Dr. Alexander Makedon**, Head, [Education Unit](#), ATINER & Independent Scholar (Retired Full Professor, Chicago State University, USA).

### Important Dates

- Abstract Submission: **18 October 2021**
- Acceptance of Abstract: 4 Weeks after Submission
- Submission of Paper: **18 April 2022**

### Social and Educational Program

The Social Program Emphasizes the Educational Aspect of the Academic Meetings of Atiner.

- Greek Night Entertainment (This is the official dinner of the conference)
- Athens Sightseeing: Old and New-An Educational Urban Walk
- Social Dinner
- Mycenae Visit
- Exploration of the Aegean Islands
- Delphi Visit
- Ancient Corinth and Cape Sounion

More information can be found here: [www.atiner.gr/social-program](http://www.atiner.gr/social-program)

### Conference Fees

Conference fees vary from 400€ to 2000€  
Details can be found at: <https://www.atiner.gr/fees>



## Athens Institute for Education and Research

*A World Association of Academics and Researchers*

### 6<sup>th</sup> Annual International Symposium on “Higher Education in a Global World”, 4-7 July 2022, Athens, Greece

The [Education Unit](#) of ATINER is organizing the 6<sup>th</sup> Annual International Symposium on “Higher Education in a Global World”, 4-7 July 2022, Athens, Greece sponsored by the [Athens Journal of Education](#). The aim of the symposium is to examine educational developments throughout the world in universities, polytechnics, colleges, and vocational and education institutions. Academics and researchers from all areas of education are welcomed. You may participate as stream organizer, presenter of one paper, chair a session or observer. Please submit a proposal using the form available (<https://www.atiner.gr/2022/FORM-COLEDU.doc>).

#### Important Dates

- Abstract Submission: **6 December 2021**
- Acceptance of Abstract: 4 Weeks after Submission
- Submission of Paper: **6 June 2022**

#### Academic Member Responsible for the Conference

- **Dr. Gregory T. Papanikos**, President, ATINER.
- **Dr. Sharon Claire Bolton**, Vice President of Research, ATINER & Professor, The Management School, University of Stirling, Scotland.
- **Dr. David Philip Wick**, Director, [Arts, Humanities and Education Division](#), ATINER & Professor of History, Gordon College, USA.
- **Dr. John Spiridakis**, Co-Editor, [Athens Journal of Education](#) & Professor, St. John University, USA.
- **Dr. George Priovolos**, Director, [Center for Small and Medium-Sized Enterprises \(CSME\)](#) & Professor, Iona College, USA.

#### Social and Educational Program

The Social Program Emphasizes the Educational Aspect of the Academic Meetings of Atiner.

- Greek Night Entertainment (This is the official dinner of the conference)
- Athens Sightseeing: Old and New-An Educational Urban Walk
- Social Dinner
- Mycenae Visit
- Exploration of the Aegean Islands
- Delphi Visit
- Ancient Corinth and Cape Sounion

More information can be found here: <https://www.atiner.gr/social-program>

#### Conference Fees

Conference fees vary from 400€ to 2000€  
Details can be found at: <https://www.atiner.gr/fees>

