

Research Trends in Science Education International: A Content Analysis for The Last Five Years (2011-2015)

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ABSTRACT: The main purpose of this article is to analyse 5 volumes and 20 issues of Science Education International (SEI) according to the authors' nationality and research topics of the articles, published in the journal between 2011 and 2015. In total, 126 articles were published, successfully submitted by 281 authors in 43 different countries. Statistical analyses showed that publications by authors from Turkey were most dominant, followed by USA and Australia. The study found that articles, based on teacher education, learning conception and learning context were those most frequently investigated by the researchers during this time-period. The number of articles published on topics related to "History, Philosophy, Epistemology and Nature of Science" and "Informal Learning" were research topics, receiving less attention by researchers. Based on the analysis, research trends were discussed.

KEY WORDS: content analysis, research trends

INTRODUCTION

Publishing articles in international journals is one of the most significant duties that researchers in all countries are expected to undertake. Dissemination and exploitation of conducted research at an international level requires publishing of research results in well-respected journals. For a journal such as SEI, which focus on research related to the science classroom, this seeks to promote the work of PhD students as well as those researchers who are catering to a practising science education audience and the dissemination of research project outcomes such as those involving European Union projects. Additionally, articles published in international journals are crucial for many researchers seeking academic promotion (Henson, 2001). As is the case in all other scientific areas, researchers working in the science and technology education field strive to publishing in respected and well-read journals. Science Education International (SEI) strives to be classified as one such journal.

SEI is the official and quarterly journal of The International Council of Associations for Science Education (ICASE). ICASE, created in 1973

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by the then so-called International Council of Scientific Unions (ICSU), in association with the United Nations Educational, Scientific and Cultural Organization (UNESCO), set out to extend and improve science education throughout the world. Today, ICASE is a network of science teacher associations, institutions, foundations and companies, working together to promote science and technology education around the world, particularly, or especially, with respect to forming links and a bridge between national science teacher associations. ICASE thus sees its rationale as facilitating communication and cooperation at national, regional, and international levels in the field of science and technology education.

ICASE has worked with its member organizations in over 75 countries to support science and technology educators in their important role of identifying, developing and disseminating the conceptual ideas associated with scientific and technological literacy. For this task, SEI plays an important role to enhance, publicise and extend the wide variety of research and operational developments associated with Science and Technology Literacy (STL) among science and technology researchers and practitioners. For this reason, the SEI provides a means for associations, institutions, universities, centres, foundations, companies, and individuals concerned with science education to share perspectives, ideas, and research findings that fosters cooperative efforts to improve science education, and which serves as a chronicle for the advancement of science and technology education throughout the world.

SEI initially grew as a 'modified' newsletter and carried advertisements and publicity for conferences and other events, as well as short focused articles. An early intention of the journal was to bridge the gap between research in science and technology education on the one hand, and material directly useful for classroom practice on the other. Initially it had subsections linked to the philosophy of education, curriculum development, classroom practice, teacher education, assessment and non-formal and informal education (Holbrook, Cavas, 2009). The first editor of SEI was Brennan Honeyman from Australia, while Robin Groves (Australia), Nicos Valanides (Cyprus), Jack Holbrook (Estonia) and Bulent Cavas (Turkey) also worked as editor of SEI. The current editorship of SEI was assigned to Baohui Zhang (China), assisted by Jack Holbrook (Estonia) and Yasemin Ozdem Yilmaz (Turkey).

After 1993, SEI became a major voice promoting the outcomes from a 1993 STL World Conference, jointly organised and co-chair by ICASE and UNESCO. With the goal of fostering scientific and technological literacy for all, the journal promoted the 6 key conference themes, namely promoting, worldwide:

1. understanding of the nature of, and need for, scientific and technological literacy in relation to local culture and values and national social and economic needs and aspirations;

2. identification of issues of special importance for personal, local and national development;
3. establishment of suitable teaching and learning environments and structures;
4. formulation of guidelines for on-going professional development and leadership;
5. development of effective communication, assessment and evaluation strategies;
6. support for non-formal, informal and life-long learning strategies.

SEI was available in a printed format until the end of 2008, but starting from 2009, SEI moved to being an online, open access journal, mainly because of the increasing cost of publication. This, however, also allowed SEI users to have the right to read, download, copy, distribute, print, search, or link to the full text of articles. Reproduction of articles was authorised provided the source was acknowledged.

The intended target audience of SEI is officials of science teacher associations, science societies and those who are involved in research and continuous professional development in the science disciplines, or promoting science subjects for primary and secondary school teachers. Nevertheless, it is expected the journal is of interest to a wider audience in the field of science and technology education and in the wider STEM and interdisciplinary concepts.

It is very important for respected journals to conduct systematic investigation of the research trends in their published academic articles. In the literature, there are articles, which analyse journals in the framework of science education in general (Rennie, 1998; Eybe & Schmidt, 2001; Tsai & Wen, 2005; Lee, Wu, & Tsai, 2009, Cavas et al. 2012) as well as with respect to specific studies, such as:

- scientific literacy (e.g. Deboer, 2000; Laugksch, 2000);
- concept development (e.g. Chiappetta, 1976; Driver & Easley, 1978);
- conceptions of nature of science (e.g. Lederman, 1992; Abd-El-Khalick & Lederman, 2000);
- the laboratory in science education (e.g. Hofstein & Lunetta, 2004; 1982);
- attitudes towards science (e.g. Gardner, 1975; Gauld & Hukkins, 1980; Osborne, Simon, & Collins, 2003), and
- argumentation (e.g. Duschl & Osborne, 2002; Ozdem, Erduran, & Park, 2011).

Although these studies provide an overview of perspectives in science education research, there is always a need for more up-to-date research. The main aim of this article is to undertake content analyses of the journal in

terms of authors' countries of publication, as well as research topics for articles published from 2011 to 2015 (i.e. in the last five years).

The research questions of this study are follows:

1. From which countries did authors contribute to the publications of SEI between 2011 and 2015?
2. In what way and to what emphasis did the topics of published papers in SEI, particular from a regional perspective, vary across the last five years (2011–2015)?

METHODOLOGY

The same methodology, which was developed and used by Tsai and Wen (2005) and Lee, Wu and Tsai (2009), was selected to conduct the content analysis. The same analysis was also undertaken for the Journal of Baltic Science Education and its research trends between 2002 to 2011 (Cavas et al, 2012).

There are three reasons for selecting the analysis method used by Tsai and Wen:

- a) it provides a simple, easy and understandable method;
- b) it provides an opportunity for researchers to compare the journals indicated in Tsai and Wen's study with the current study; and
- c) this method of review is the most recent one used among the science education research reviews.

For this reason, the same methodology for country ranks and research topics was implemented in this study:

Each paper is allocated one point. If a paper is published by more than one author, who each come from a different country, the one point is divided into certain proportions for authorship from each participating country. For instance, if a paper is written by two authors, the first being a UK author, while the second is a US author, then for this particular paper the UK authorship gains a score of 0.6 while the USA authorship acquires a score of 0.4. By this method, the accumulated score for successful authorship from each country is calculated and compared by year, as well as by journal issue.

A total of 126 articles are included in this study, examined according to nationality of author/s and the topic of the article. However, informative additions in journals, such as editorial sections, are excluded. Detailed information for the accumulated score of each country is presented in Table 1. This table is a slight modification from that used in the study published

by Tsai and Wen (2005), in that an additional row is added for the case of six authors in one article.

Table 1 Author’s score allocation for multi-author research papers.

<i>Number of Authors</i>	<i>Order of Specific authors</i>					
	1	2	3	4	5	6
1	1					
2	0.60	0.40				
3	0.47	0.32	0.21			
4	0.42	0.28	0.18	0.12		
5	0.38	0.26	0.17	0.11	0.08	
6	0.37	0.24	0.16	0.10	0.07	0.06

For research topic categorization, categories are those developed by Tsai and Wen (2005) using the framework of National Association for the Research in Science Teaching conference strand categories (<http://www.educ.sfu.ca/narst/sub-g-proc.html#47858>). Table 2 elaborates the categorization of research topics.

Further details associated with this study are presented in three parts: general analysis on the journal, which consist of the issues, articles, authors and countries from 2002 to 2011; analyses of published papers during the years 2011-2015 in terms of authors’ nationality, and analyses of published papers during the years 2011-2015 in terms of research topics.

General Information about the Journal

SEI is the official and quarterly journal of ICASE. SEI is indexed in ERIC (Education Resources Information Center); The Asian Education Index; Education Research Complete Database; Index Copernicus Journals Master List; DOAJ Directory of Open Access Journals; and The Education Research Global Observatory.

SEI accepts articles using online submission system. Submitted manuscripts are reviewed anonymously by 2-3 international referees. All tracking of manuscripts and reviewers is done by the editor and associate editor. SEI does not accept submissions previously published elsewhere through print or electronic medium. All of the articles are reviewed within three months of submission. The editorial board of SEI consists of science and technology educators from around the world. Table 3 presents information about the number of issues, articles, authors and countries according to year. In the last 5 years, the journal was published quarterly.

Table 2 **Category table for research topics**

No	The name of category	Category explanation
1	Teacher Education	Pre-service and continuing professional development of teachers; teacher education programs and policy; field experience; issues related to teacher education reform; teacher as researcher/action research.
2	Teaching	Teacher cognition; pedagogical knowledge and pedagogical content knowledge; forms of knowledge representation (e.g. metaphors, images, etc.); leadership; induction; exemplary teachers; teacher thinking; teaching behaviours and strategies.
3	Learning — Students' Conceptions and Conceptual Change (Learning — Conception)	Methods for investigating student understanding; students' alternative conceptions; instructional approaches for conceptual change; conceptual change in learners; conceptual development.
4	Learning — Classroom Contexts and Learner Characteristics (Learning — Context)	Student motivation; learning environment; individual differences; reasoning; learning approaches; exceptionalities; teacher–student interactions; peer interactions; laboratory environments; affective dimensions of science learning; cooperative learning; language, writing and discourse in learning; social, political, and economic factors.
5	Goals and Policy, Curriculum, Evaluation, and Assessment	Curriculum development, change, implementation, dissemination and evaluation; social analysis of curriculum; alternative forms of assessment; teacher evaluation; educational measurement; identifying effective schools; curriculum policy and reform.
6	Cultural, Social and Gender Issues.	Multicultural and bilingual issues; ethnic issues; gender issues; comparative studies; issues of diversity related to science teaching and learning.
7	History, Philosophy, Epistemology and Nature of Science.	Historical issues; philosophical issues; epistemological issues; ethical and moral issues; nature of science; research methods.
8	Educational Technology	Computers; interactive multimedia; video; integration of technology into teaching; learning and assessment involving the use of technology.
9	Informal Learning	Science learning in informal contexts (e.g. museums, outdoor settings, etc.); public awareness of science.

Table 3 The number of issues, articles, authors and countries from 2002 to 2011

V.	I.	# of Articles	# of Authors	Countries Tot	Contributed Countries
2011 Vol.22	1	6	8	6	<i>Israel, Trinidad, West Indies, Turkey, Portugal, Kenya, New Zealand</i>
	2	6	13	6	<i>USA, Bahamas, UK, Turkey, Estonia, Ireland</i>
	3	5	15	5	<i>Turkey, USA, Germany, Jordan, Estonia</i>
	4	7	18	5	<i>Australia, USA, UK, Turkey, New Zealand</i>
2012 Vol.23	1	5	16	4	<i>Croatia, Portugal, Turkey, Australia</i>
	2	5	17	7	<i>Turkey, Malaysia, Australia, India, UK, South Africa, Estonia</i>
	3	6	17	6	<i>India, USA, Oman, Australia, Brazil, Turkey</i>
	4	6	17	3	<i>USA, Turkey, Israel</i>
2013 Vol.24	1	5	12	5	<i>Australia, China, Philippines, Finland, USA</i>
	2	5	10	5	<i>Turkey, Finland, Germany, USA, New Zealand</i>
	3	7	11	6	<i>Turkey, Australia, Ireland, Korea, USA, New Zealand</i>
	4	5	16	4	<i>Turkey, Mauritius, Korea, USA</i>
2014 Vol.25	1	13	26	12	<i>Finland, Czech Republic, Germany, Belgium, Netherlands, Slovenia, Poland, Cyprus, Turkey, Greece, UK, Austria</i>
	2	5	15	7	<i>Estonia, Finland, Cyprus, France, Latvia, Austria, Romania</i>
	3	5	11	5	<i>USA, UK, Brazil, Turkey, UAE</i>
	4	5	6	2	<i>USA, Turkey</i>
2015 Vol.26	1	5	10	4	<i>Singapore, Turkey, New Zealand, West Indies</i>
	2	8	18	6	<i>Indonesia, Argentina, Turkey, USA, China, Cyprus</i>
	3	8	15	7	<i>Estonia, Greece, Singapore, Turkey, USA, Thailand, Portugal</i>
	4	9	15	5	<i>USA, Turkey, UK, Nigeria, Trinidad & Tobago, Kenya</i>
Total	20	126	286	43	

RESULTS

The results are given in relation to the Research Questions.

RQ1: From which countries did authors contribute to the publications of SEI between 2011 and 2015?

Table 4 shows the ranking for the countries of authors, according to points given over the last 5 years. Table 4 also shows that authors from Turkey and USA were the most prolific in successfully publishing in SEI ranked first and second in terms of country of origin. The table also shows that papers from Turkey and USA were published in each of the five years. For the UK and Estonia authors successfully published in all years except for 2013. Less frequently, submissions were published from New Zealand, Portugal, Australia and Germany (3 papers between 2011 and 2015). Authors' submissions published from countries, such as France, Poland, Belgium, Latvia, Netherlands, Romania, Slovenia, Jordan, Bahamas, Philippines, Malaysia, Kenya and Oman are also present, indicating a wide range of contributions being received worldwide.

Table 4 Country Ranks for Authors of Articles published in the SEI from 2011-2015

2011		2012		2013		2014		2015	
C*	S*	C	S	C	S	C	S	C	S
Turkey	8	USA	6	Turkey	4,4	USA	6	Turkey	10,4
USA	3,6	Turkey	5	USA	4	Turkey	4,53	USA	3,6
UK	3	India	1,64	Korea	2,6	Germany	3	Singapore	2
Estonia	2	Australia	1,59	Australia	2	Finland	2,79	Kenya	1
N.Zealand	1,4	Croatia	1	Finland	2	Czeck Rep	2	UK	1
Israel	1	Portugal	1	N.Zealand	2	UK	2	Nigeria	1
West Indies	1	S.Africa	1	China	1,4	Austria	1,7	Trin Tobago	1
Portugal	1	Estonia	1	Germany	1	Cyprus	1,47	N. Zealand	1
Ireland	1	Brazil	1	Ireland	1	Estonia	1,42	West Indies	1
Australia	1	Israel	1	Mauritius	1	Greece	1	Indonesia	1
Germany	0,68	Oman	0,88	Philippines	0,6	Brazil	1	Argentina	1
Kenya	0,6	Malaysia	0,7			UAE	1	China	1
Bahamas	0,4	UK	0,19			France	0,79	Cyprus	1
Jordan	0,32					Poland	0,38	Estonia	1
						Belgium	0,34	Greece	1
						Latvia	0,18	Thailand	1
						Netherlands	0,17	Portugal	1
						Romania	0,12		
						Slovenia	0,11		

* C for Country and S for Score

Table 5 Comparisons of country ranks in SEI between 2011-2015

Countries	2011	2012	2013	2014	2015	Total Score	Mean
1. Turkey	8	5	4,4	4,53	10,4	32,33	6,47
2. USA	3,6	6	4	6	3,6	23,2	4,64
3. Korea			2,6			2,6	2,6
4. Finland			2	2,79		4,79	2,40
5. Czeck Rep				2		2	2
6. Singapore					2	2	2
7. India		1,64				1,64	1,64
8. Australia	1	1,59	2	1,7		6,29	1,57
9. Germany	0,68		1	3		4,68	1,56
10. UK	3	0,19		2	1	6,19	1,55
11. New Zealand	1,4		2		1	4,4	1,47
12. Estonia	2	1		1,42	1	5,42	1,36
13. Cyprus				1,47	1	2,47	1,24
14. China			1,4		1	2,4	1,2
15. Argentina					1	1	1
16. Croatia		1				1	1
17. Indonesia					1	1	1
18. Mauritius			1			1	1
19. Nigeria					1	1	1
20. South Africa		1				1	1
21. Thailand					1	1	1
22. Trinidad Tobago					1	1	1
23. UAE				1		1	1
24. Brazil		1		1		2	1
25. Greece				1	1	2	1
26. Ireland	1		1			2	1
27. Israel	1	1				2	1
28. West Indies	1				1	2	1
29. Portugal	1	1			1	3	1
30. Oman		0,88				0,88	0,88
31. Kenya	0,6				1	1,6	0,8
32. France				0,79		0,79	0,79
33. Malaysia		0,7				0,7	0,7
34. Philipines			0,6			0,6	0,6
35. Bahamas	0,4					0,4	0,4
36. Poland				0,38		0,38	0,38
37. Belgium				0,34		0,34	0,34
38. Jordan	0,32					0,32	0,32
39. Latvia				0,18		0,18	0,18
40. Netherlands				0,17		0,17	0,17
41. Romania				0,12		0,12	0,12
42. Slovenia				0,11		0,11	0,11

Table 5 presents the total and mean points allowing a comparison of successful contributions from authors from different countries, given per year. Country ranking is indicated according to the mean value, which is calculated by a country's total point divided by years in which any paper is published. The publication effort by authors is systematically taken into consideration rather than actual number of papers. Results show that Turkey, USA, Korea and Finland have the highest ranks. Ranking for countries based on successful author's contributions are given in Table 5.

RQ2: In what way and with what emphasis did the topics of published papers, particularly from a regional perspective in SEI, vary across the last five years (2011–2015)?

Table 6 presents frequencies of topics of articles published in the journal between 2011 and 2015. It shows that “Teacher Education” (29); “Learning — Students’ Conceptions and Conceptual Change” (25); “Learning — Classroom Contexts and Learner Characteristics” (14); “Cultural, Social and Gender Issues” (14); “Teaching” (13); and “Goals and Policy, Curriculum, Evaluation, and Assessment” (12) are among the topics most frequently investigated.

Based on the impact of topic analysis by years, intensive research regarding teacher education was carried out more recently and correspondingly many articles on it are published. In 2013 and 2014, ten articles on teacher education a year were published. The second most frequent research topic in SEI was “Learning — Students’ Conceptions and Conceptual Change” (25). Many articles were published regularly on this topic and in particular, 11 articles were published in 2015.

Less frequent, articles related to “Learning-Classroom Contexts and Learner Characteristics” (14); “Cultural, Social and Gender Issues” (14) topics are included on a regular and systematic basis between 2011 and 2015. Topics among the least included are SEI articles on “History, Philosophy, Epistemology and Nature of Science” (5); “Informal Learning” (6) and “Educational Technology.” Studies related to the History, Philosophy, Epistemology and the Nature of Science fields are published merely within the last two years. Moreover, research regarding informal learning is only included in 2011, 2012 and 2014. Publications on these three topic, in total, form only 14,3 % of all published articles.

By considering the ICASE regional set-up, publications by region are as following:

Most of the publications are by authors within Europe (69,7%), followed by North America and Asia. Detailed information is presented in Figure 1.

Table 6 Frequencies of topics of articles in SEI from 2011 to 2015

Research topic	2011-2015	2011	2012	2013	2014	2015
Teacher Education	29	-	5	10	10	4
Teaching	13	2	1	2	3	5
Learning – Conception	25	4	5	3	2	11
Learning - Context	14	8	3		1	2
Goals, Policy, Curriculum	13	1	5	1	4	2
Culture, Social and Gender	14	5	1	3	2	3
Philosophy and History	5				2	3
Educational Technology	7	-	1	3	3	-
Informal Learning	6	4	1		1	-
Total	126	24	22	22	28	30

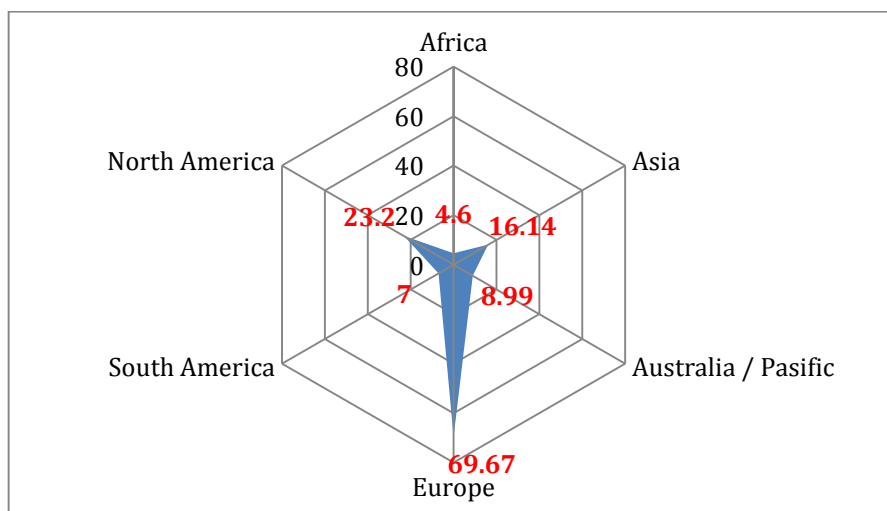


Figure 1 Regional Representation of Published Articles based on 'point scores'

Figure 1 as shows that the fewest published articles are from Africa, South America and Australia/Pacific.

DISCUSSION AND CONCLUSION

The data shows that articles are included from both English speaking and non-English speaking countries' papers. In SEI, the breakdown based on the points system, is approximately 38,6% from authors based in English speaking countries, with authors from the US being the major contributor and 61.4 % from non-English speaking countries, with authors from Turkey, S. Korea and Finland being the major contributors.

Author country/region breakdown

This breakdown can be compared with that from other journals seen as major journal in the field. An analysis conducted by Tsai and Wen (2005) on articles published in the following American edited journals - Science Education (SE), Journal of Research in Science Teaching (JRST) and also the UK edited journal - International Journal of Science Education (IJSE), shows that articles are especially from authors in the following countries: USA, Australia, Canada and UK. On a more detailed breakdown, the analysis indicates 40% of articles are published from non-English speaking countries in IJSE, 27% in SE, but only 14% in JRST. Whereas American researchers' papers form 70% of all articles in JRST, the rate reduces, not surprisingly, to 17,7% in IJSE (Tsai & Wen, 2005).

In another study, carried out by Cavas et al. (2012), country and topic analysis were determined in the Journal of Baltic Science Education (JBSE), for articles published between 2002 and 2011. The dominate country for authors since 2006 was Turkey. Before that, between 2002-2005, strong preference was given to articles from the Baltic Region. When compared with the journals mentioned above, articles from predominately Turkish, Finnish, Swedish, Latvian and Lithuanian authors were determined to have been accepted for publication by JBSE (Cavas, et al, 2012).

The above suggests that SEI is more close to IJSE than American journals in attracting articles from authors in non-English speaking countries. In both cases it seems this comes about because the majority of articles coming from the European region where multiple languages abound. In addition, ICASE has 6 regional links enable contacts in countries on a world wide scale, thus linking with potential authors in a wide range of non- English speaking countries. Also, a major advantage of SEI for authors in non-English speaking countries is that the editors are willing to assist authors in compiling their articles in English and this is

especially the case where authors are practitioners rather than academicians undertaking research.

A major disadvantage of SEI compared to the other journals is that it is only online. While this is offset by being open access, it limits access especially for authors undertaking review type articles. However, it does provide opportunities to authors with limited access to journal from major publishers, which can be a major issue in the developing world, or for authors without access to tertiary institutions. In turn this allows SEI to relate to practitioners who are seeking articles related to practical classroom implementation.

By far the major threat to SEI serving as a major science education journal is its usefulness to readers. From its base related to practicing teachers. SEI need to strongly appeal to science teachers at K-12 levels as well as teacher educators offering both pre- and in-service courses. Nevertheless, SEI also needs to look forward to developments in teaching and therefore needs to embrace research developments. Striking the right balance is a major challenge facing SEI.

In the light of the results obtained from both studies mentioned above, articles from Turkey and US have a substantial impact on articles published in SEI. In this regard, it is useful to look further into the reasons for authors from Turkey's having developed the capacity to publish numerous articles in SEI.

When the number of science education researchers in Turkey is compared to those in other countries, the difference in the scores given in Table 4 and 5 becomes particularly meaningful. Although exact numbers are not known, the number of science education researchers in Turkey is expected to be more than in many countries since Turkey has a population more than 72 million. Another important reason for the high number publication from Turkey is related to investment in improving teacher education reform. Faculty and research fellows from education faculties were sent abroad to attend master, PhD, or Post-Doctoral studies with a US\$177.2 million loan (US\$90.2 million from the World Bank and US\$87 million from the Turkish Government). A condition of the World Bank loan is that the Higher Education Council revises and improves pre-service teacher training curricula, textbooks and other pedagogical material and supports research projects (Güven, 2008). This encourages more and more researchers from Turkey to enrol in graduate level programs in European and United States Universities. These researchers return back to Turkey with high levels of writing and researching skills plus an understanding of English and reflect these abilities in their international research and publications (Cavas et al. 2012).

Taking into account ongoing academic training programs in Turkey, USA and UK and the outcomes of this research, Turkish researchers are thought to be capable of carrying out significant studies in terms of quality

and quantity in science and technology education fields worldwide in the near future.

Topic areas

According to the topic analysis of papers published in SEI, "teacher education" is seen to be the main area studied. This situation is enhanced, in particular, by the help of European Union funds for teacher professional development. For example, in this context, SEI carries publications on the PROFILES project, which were published as a special issue in 2014. In addition to "teacher education", other noteworthy topic areas are Learning-Students' Conceptions and Conceptual Change" accompanied by "Learning-Classroom Contexts and Learner Characteristics" and "Cultural, Social and Gender Issues" topics.

In examining other respected journals in terms of research topics in published articles, it is seen that "Learning Conception" and "Learning-Classroom Contexts and Learner Characteristics" are the most investigated research topics and in the case of JRST (Tsai & Wen, 2005), the top 3 areas correspond directly with those from SEI.

However other journals, unlike SEI show a prominence for "Goals, Policy, Curriculum" articles. This difference is not surprising giving the SEI emphasis in catering for practitioners.

Considering the low frequent article areas, in SEI these are "Informal Learning" and "Educational Technology" and especially In SE, JRST and IJSE, "Teacher Education", "Informal Learning" and "Educational Technology" research topics did not contribute much to the total quantity of published articles. Again the lack of attention in SEI to "History, Philosophy, Epistemology and Nature of Science" relates to the practitioner emphasis, but it is somewhat surprising that SEI includes a higher percentage of articles related to Teacher Education and thus presumably giving more attention to promoting research in the areas of pre- and in-service education.

In conclusion, SEI maintains a place as a well-supported journal with a meaningful focus on practitioner science education research. It strongly caters for non-English speaking authors, while striving to ensure a worldwide balance between authors from different regions. As an online, open access journal published quarterly it represents a useful channel for authors to published their esteemed research. Past issues of the journal can be accessed on www.icasonline.net/seiweb .

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