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Some Selected Resources for Using History of Mathematics in the Classroom

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Abstract: Using history of mathematics in mathematics lessons is advised in many studies and in renewed elementary mathematics instructional program. But most of the teachers seem to be hesitated about using history of mathematics on the lessons. One of the reasons of this hesitation is that teachers have no information or they don't have enough information about history of mathematics and usage of it on the lessons. Also teachers seem to have difficulties in finding resources of knowledge they need to learn about history of mathematics. Because of these reasons introducing some selected resources about history of mathematics is aimed in this research. Document analysis method is used in the study. Turkish web sites, projects, thesis, books, and journals about history of mathematics are introduced by this study. Also some researches done in our country about using teaching applications enriched by history of mathematics in classroom environments are given place in the study.

Keywords: Mathematics education, history of mathematics, resources about history of mathematics.

Nowadays many groups have the same idea that mathematics teaching in different class levels may be enriched by History of Mathematics (HM). For example groups as National Council of Teachers of Mathematics and Mathematical Association of America advise using HM in classrooms for a meaningful mathematical learning with real experiences (Baki & Güven, 2009). Also it is emphasized in many studies that usage of HM in mathematics teaching has many advantages both for students, teachers and the knowledge learnt (Charalambous, Panaoura, & Philippou, 2009; Gürsoy, 2010; Tözluyurt, 2008). But it is known that most of the teachers hesitate to use HM on lessons too (Weng Kin, 2008). One of the reasons of these hesitations is that the teachers have not enough or any knowledge about HM and usage of it on lessons (Jankvist, 2009; Weng Kin, 2008). This situation prevents teachers to use HM on lessons.

With the elementary mathematics instructional program renewed in 2005 teachers are advised to use HM on learning environments but they are not guided much about this subject. Self experiences at work or knowledge gained by hearings from other teachers don't allow using HM on lessons as expected by instructional program. This reduces self confidence of teachers about applying historical knowledge in class (Lingard, 2000). Also when the relevant literature is examined, it is seen that teachers have some difficulties about finding the available sources where they can learn the knowledge they need about HM (Pinto, 2010; Weng Kin, 2008) so they complain about this. To go further in enriching mathematics lessons with HM, the sample applications and applicable teaching materials need to be developed (Fasanelli vd., 2000).

When the things above are taken into consideration, introducing resources about HM becomes very important. That's why in this study some Turkish web sites, projects, thesis, books and journals about HM are mentioned. Also some studies done in Turkey about practising teaching applications

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enriched by HM in real classroom environments are talked about here too.

Method

This study is a compilation style research. Document analysis method is used in the study. This method depends on collection and examination of the present recordings and documents (Balcı, 2006).

Resources about HM

Web sites about HM. http://www.bilmat.ktu.edu.tr/matematiktarihi/

Aim of this web site is guiding teachers about how to use HM on lessons. The general aim of this web site in consultancy of Prof. Dr. Adnan BAKİ is endearing mathematics to the students who see it as an abstract, bleak, unserviceable and afraid of it, giving information about HM to the students and teachers and presenting sample activities about using HM on lessons.

http://www.matder.org.tr/

This web site belongs to Mathematicians Association. This association regularly arranges a national symposium every year. HM is also included on the papers in this symposium too.

Projects about HM. Life Stories of Mathematicians and Creative Drama (Oylum AKKUŞ, Hacettepe University).

This project contains an example of using creative drama as a transfer method of life stories of famous mathematicians (Evariste Galois, Niels Hendrik Abel and Albert Einstein). Each participant conducts five workshops of three hour study for this project. A survey applied to all participants to learn what they know about the life of scientist before the projects and same survey was given to the participants again after the project. Also participants are provided to keep diaries about the activities. When the results are discussed, it is seen that this project reached its purpose.

Thesis about HM. Oprukçu-Gönülateş (2004) searched attitudes of teachers about using HM in mathematics teaching and their ideas about different usage methods of HM. Also the researcher searched changes in attitudes and ideas of teachers after applying a sample application of using HM in mathematics teaching. In this study quasi-experimental method is used. The results of study show an increase of participants attitudes and knowledge about using HM in mathematics teaching. According to the results the increase of teacher candidates is found meaningless but there is found a meaningful increase in number of methods about using HM on mathematics lessons.

İdikut (2007) searched the effect of using HM on the academical achievement of students, their attitude towards the lesson and the remaining level of the knowledge they gained. In this study conducted with 7th class students, pre test, final test and experimental model with control group are used. Lessons are given in guide of teacher guide book in control group but in experimental group HM technique is applied in addition to this. Results show that lessons supported with HM don't show a meaningful difference about attitude and permanency when compared with lessons guided only by teacher guide book but also they effect much the achievement of students positively.

Tözluyurt (2008) searched views of students from last classes of high schools about lessons in numbers learning area with chosen activities of HM. He prepared a meeting form as a data collection tool to determine students views about lessons with chosen activities of HM related to number learning area. At the end of the study it is found that students opinions about adding HM to the mathematics lessons are positive. Students participated in the research said they didn't see the lessons used HM as mathematics but the lessons are more joyful, easy and interesting with HM.

Gürsoy (2010) searched the effect of HM lesson on belief and attitudes of elementary mathematics teacher candidates about using HM in mathematics teaching. Semi structured interview method and a scale about HM are used in collecting data. At the end of the study HM lesson is found to be positively effective on belief and attitudes of teacher candidates about using HM in mathematics teaching. Also it is determined that teacher candidates think using HM may be useful in mathematics teaching.

Albayrak (2011), made an experimental research evaluating effects of a teaching model enriched with HM on mathematical self-efficacy and achievement. Study was conducted with 8th class students. At the end of the study only in a school there is found a meaningful difference in final test results of the experiment and the control group. Also it is seen that there is not a meaningful difference between the mathematical self-efficacy scale's pre and final test results of experiment and the control group students. Finally it is found experimental group students generally have positive ideas about lessons enriched with HM.

Books about HM.

Mathematics Education from Theory to Practice (Prof. Dr. Adnan Baki, Harf Eğitim Publications)

This book includes Philosophy of Mathematics, HM, Special Teaching Methods, Computer Supported Mathematics Teaching, Measuring and Evaluating lessons given during mathematics teacher degree program in education faculties. In second part of the book the historical development processes of mathematics and how it reached to us till today is explained.

Technique and Science in Islam (Prof. Dr. Fuat Sezgin, İstanbul Metropolitan Municipality Culture Co. Ltd. Publications)

This book examines the role of Islamic science in world science history. This book published in 5 volumes presents contribution of Islamic scientists to the world science history in such as astronomy, medical sciences, geometry, geography, optics, chemistry and marine.

Story and Adventure of Mathematics (Prof. Dr. Ali Dönmez, Sosyal Dönüşüm Publications)

As the result of a 40 year study, to fill the gap in our country about HM Prof. Dr. Ali DÖNMEZ wrote a 10 volume book with the name "Story and Adventure of Mathematics". There is knowledge about French, Italian, German, Greek, Roman, Turkish and Eastern mathematicians and Chinese, Japanese, Maya, Mesopotamian, Egyptian and Greek mathematics.

Great Turkish Scientists Series (İsmail Bilgin, Damla Publications)

This book presents studies of Muslim scientists which they made devotedly, patiencely, succeeded against many difficulties in the style of a story this series is said to help individuals thinking to be a scientist and giving effort to reach the modern civilization level in gaining self-confidence. There are 10 books in this series: **1.** Cabir Bin Hayyan, **2.** El-Harizmi, **3.** Biruni, **4.** İbni Sina, **5.** Cezeri, **6.** Akşemseddin, **7.** Ali Kuşçu, **8.** Piri Reis, **9.** Mimar Sinan, **10.** Erzurumlu İbrahim Hakkı.

Asar-ı Bakiye (Salih Zeki, Babil Publications)

Salih Zeki, presents the mathematics and astronomy studies of Islamic world in middle age with all their dimensions in his book named Asar-ı Bakiye (Immortal Works) and tries to prevent some western people intentionally or unintentionally distort historical facts. There is knowledge about lives of mathematicians, trigonometry and algebra in this 3 volume series.

Journals about HM

Mathematics World (http://www.matematikdunyasi.org/)

Mathematics World is a journal that aims to transpose mathematics to the young people in a simple language. It is mostly for high school and university students. But because of universality of mathematics, it comes out as a journal whom everyone benefits from. This journal sometimes give information about life stories of mathematicians and historical development of mathematics.

Science and Technique (http://www.biltek.tubitak.gov.tr/)

Science and Technique Journal guides the route of young people to science for more than 40 years. Directing the abilities and attitudes of youth in our country to the science and technique research areas, spreading working enthusiasm about these subjects, introducing science and technique studies to the public are some aims of the journal. This journal sometimes gives information about life stories of mathematicians and HM.

Science Kid (http://www.biltek.tubitak.gov.tr/cocuk/)

Readers of this journal are 7-12 aged elementary students. Some aims of the journal are endearing science to children and youths, make them notice that they can contribute to world of science, show science is a part of life, increase the creativity in science and tempt to make invention. Journal sometimes give knowledge about life stories of famous mathematicians.

Studies about practising teaching applications enriched with HM in real class environment

Özmen, Taşkın, Arslan and Yıldız (2010), studied ideas of students about teaching ancient weight and height measuring scale units topic with worksheets enriched with HM. Application conducted with 30 students of 6th class. At the end of the research it is found that lessons enriched with HM increase the learning ambition of students. It is also seen students never heard old measure units before and they learnt these units after the practice. Also it is determined using various visual materials makes mathematics lessons more joyful.

Kaygın, Balçın, Yıldız and Arslan (2011), searched the effect of teaching Fibonacci number series and golden ratio subjects with worksheets enriched by HM on student achievements and student ideas about this. Practice conducted with 30 students of 8th class. Data is collected with a performance test and a survey formed with open ended questions. At the end of the study it is found that teaching Fibonacci number series and golden ratio subjects enriched with HM has a positive effect on student success and make students enjoy the lesson.

Seyitoğlu, Akkaya, Yıldız, Arslan and Çoştu (2011), searched the ideas of students about practices developed about history of Pythagoras theorem. Research conducted with 15 students from 8th class. Data gained from observation notes recorded by researchers during the lessons and semi structured interviews with the students. At the end of the study most of the students indicated they enjoyed the practice very much and they wanted to study lessons in this way till then.

Yıldız, Çabakçor, Özdoğan and Arslan (2011), searched views of the students and teachers about lessons of fractal subject enriched with HM. Practice conducted with 35 students on 8th class. Student compositions, semi structured interviews of students and teachers are used as the data collection tools. At the end of the study the lesson with HM is found to be more interesting and useful for the students and generally students think the used materials are interesting and effective.

Özdemir and Göktepe (2012), prepared an application with students formed of puzzles to make students learn life story of a famous mathematician. Research conducted with 33 students of 6th class.

Data is collected by a meeting form formed with 7 open ended questions in the research. Students indicate they enjoyed the lessons and they also learned life story of a mathematician in detail.

Conclusion and recommendation

Limited number of sources and studies about HM are examined in this study. There is found only one project about HM in the study process. This situation shows there is a need to make more projects about HM related to different subjects in larger scales.

When we look at books, journals and web sites about HM, they seem to give information about historical development process of mathematics, life stories of mathematicians and historical development of a mathematical concept or subject more. This shows need to the studies and sources about how to use HM on lessons.

When thesis about HM are examined, it is seen there is very little number of studies and there is not a study conducted with teachers. When teaching applications enriched with HM are examined, it is found most of the studies are focused on 8th class students. This shows there is a need of studies searching student and teacher experiences about HM.

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