‘Whys’ and ‘hows’ of using the newspaper preparation method in teaching the philosophy of mathematics

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This study aims to suggest a new method to enrich the standard of the philosophy of mathematics course. The newspaper preparation method was applied in the same author's study about the history of mathematics course, and successful results were obtained. It is clear how much the history and philosophy of mathematics courses have in common. In this respect, the idea of trying to teach the philosophy of mathematics course with the same method was considered. Therefore, this paper describes a presentation teaching the philosophy of mathematics course with the newspaper preparation method delivered at the British Society for Research into Learning Mathematics Conference as an example.

Keywords: philosophy of mathematics; newspaper preparation method

Introduction

While developing the newspaper preparation method I tried to minimize the disadvantages of project based learning and cooperative learning and focused on the advantages of both methods together. The project-based learning technique is focused on student-centered learning and requires project participants to actively participate in the learning practice both physically and cognitively (Erdoğan et al., 2016; Winn, 1995). The following have been reported as the method’s potential downsides and challenges: difficult method for participants, particularly for the project supervisor; lengthy process; increased responsibilities for the instructor; cost of application; high probability of not producing an ideal output; difficulty of reporting and planning due to its interdisciplinary nature; difficult to assist and support students (Moursund, 2003; Korkmaz & Kaptan, 2001). In this methodology, the instructor performs the responsibilities of organising and arranging lessons in addition to making recommendations (Diffily, 2002). During the assessment stage, the instructor and the students collaborate to assess both the process and the result (Başbay, 2005).

The pupils must collaborate and trust one another to achieve a shared objective. Students who would instead work independently could find this requirement tiresome (Sharan & Sharan, 1990). Bower and Richards (2006) stated that cooperative learning has many drawbacks. For instance, if there is not enough incentive for the target to be reached, the effectiveness will decrease; similarly, inefficacy occurs, when the group members lack the necessary operational characteristics. Thus, if students are not dependent on the group, they will likely find it challenging to maintain their positions, and the groups might need to be reorganised. Both the instructor and the student will agree that none of these processes are simple (Taşpınar, 2018). Due to the fact that the level of understanding of every student is different, when a student perceives that he is working at a level below the rest of the group, he might lose track of the course. Furthermore; disagreements, unnecessary dialogues, comprehension speed differences, and tendencies to dominate

the group by some pupils are also the drawbacks of the cooperation method (Koyuncu, 2022a; Middlecamp, 1997).

Why should the newspaper preparation method be used?

As in many parts of the world, students are divided into departments according to their interests and skills in Turkey. The Turkish education system separates students (aged 14-17) into three branches at the high school. These are;

- Numerical/natural-sciences
- Verbal
- Equally Weighted

After students graduate from high school, they take a central university exam after which they may get into a university. For example, if a pupil wants to be a lawyer, bank employee or insurer etc., they must choose the equally-weighted branch at high school. Similarly, if they want to be a mathematics teacher, engineer, or dentist etc., they have to opt for the numeric/natural-sciences. Lastly, if a pupil wants to be a sociologist, historian, or journalist, they must go for the verbal department at high school. If a student does not choose the verbal but numerical branch, the main reason is that they don't like verbal lessons/humanities such as literature, history, philosophy etc. In a nutshell, the students who have to take the philosophy of mathematics course (in the department of mathematics education) come to universities from the numerical/natural-sciences branches of high schools.

According to numerical students, teaching a lesson by transferring only encyclopedic information often makes the class less appealing (Koyuncu, 2020; 2022b). For those who have to take the course of philosophy of mathematics – as a required course – it will not be difficult to predict the degree of inanimation. Moreover, this situation reduces the interest in the lesson, and prevents the retention of the imparted knowledge. Then the students inevitably will not want to use the information they learned in the relevant course – which they naturally forgot – later in their professional life. In this respect, I think that it will be useful to teach a lesson with activities without any manipulation of the name and content of the lesson. I believe that this method will contribute to the understanding as well as the learning of the philosophy of mathematics.

The same applies to high school years. I mean, a mathematics teacher will have a wide range of presentations during lectures and an intellectual stance in the eyes of their students to the extent that s/he has mastered the philosophy and history of mathematics. It is not difficult to predict the pleasure such a teacher will get from his profession and how much his students will focus on his lesson. Therefore, the target audience of this study is primarily pre-service mathematics teachers and relevant academic staff. The newspaper preparation method was applied in the same author's study about the history of mathematics course, and successful results were obtained. Thanks to this method, learners are far from just passive listeners. Instead, they turn into individuals who research, think actively, question, criticise, read, and particularly write (Koyuncu, 2022a). It is clear how much the history and philosophy of mathematics courses have in common. In this respect, the idea of trying to teach the philosophy of mathematics course with same method was realised. In Figure 1, I have presented a newspaper page about the history of mathematics, which I think will inspire a newspaper with the theme of the philosophy of mathematics. I have added the link to the newspaper's online version under the picture.

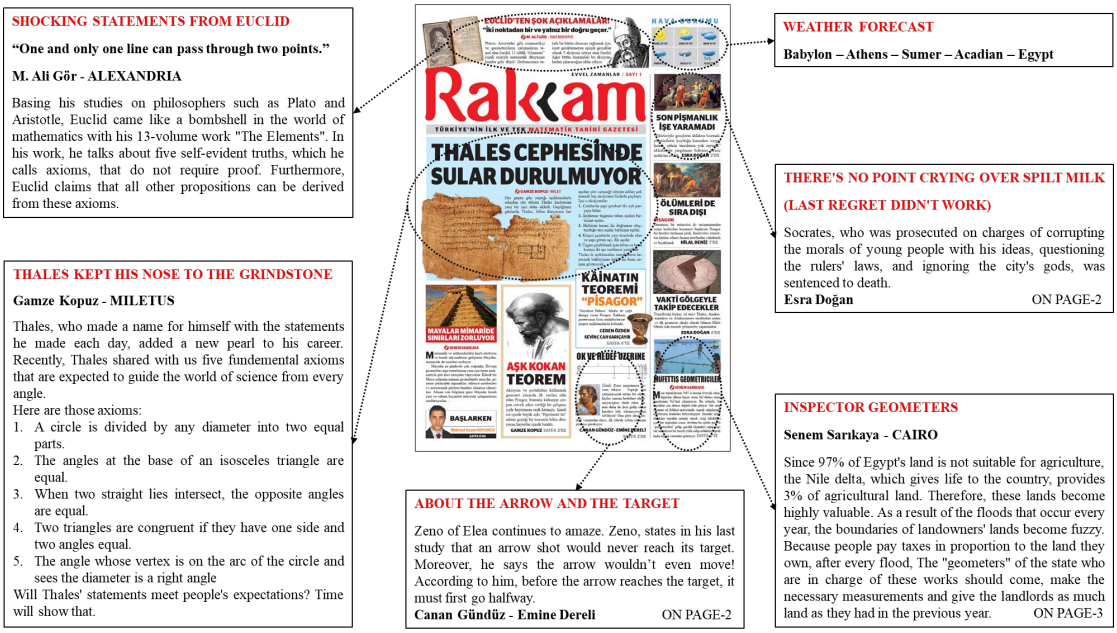

Figure 1: A sample page of the newspaper (Available at: https://rakkam.vercel.app/)

How should the newspaper preparation method be used?

Laying the groundwork for active participation, the roles of learners are determined, and thus they are provided to learn by doing and experiencing. In this way, it is necessary to transform the learners from passive listeners into individuals who think actively, research, question, criticize, read, and mainly write. In other words, an effort should be made to establish a conducive learning atmosphere for pupils. It means, it is possible to avoid the disadvantages of the methods I mentioned above and combine the advantages. In fact, this is the main philosophy of this method.

Students receive instructions on the study's goal, research ethics, the assignment of tasks, and the process during the first week of training. The application builds on the philosophy of mathematics course objectives, lessons, and outcomes. Within the framework of the course, students are instructed to produce a newspaper which is reminiscent of the past. Guiding the students is the key component of this methodology. The lecturer separates the topics in accordance with the page theme, analyses the reports' consistency with the course's theme, reviews the veracity of the images, and determines whether or not they are written in newspaper language.

For example, “Euclidean and non-Euclidean Geometries’ is a subject of the course. This title can be carried out by the Moscow Reporter by interviewing Nikolai Ivanovich Lobachevsky on the “Interview” page (as if Lobachevsky was still alive). Similarly, another topic is “Logicism”. This subject can be tackled by London reporter of the newspaper by interviewing Bertrand Russell (as if Russell is alive). Again, a student may be given the role of Plato, and asked to write a column – as if Plato were alive – in which we can learn Platonism from Plato himself. This name – Plato – is of course subject to change. For instance; Frege for logicism, Brouwer for intuitionism. Lastly, "The existence of mathematical objects" may be discussed by the Greek representative on the newspaper's book introduction page.

Each group is instructed independently since the news they write for the newspaper appears on a different page. The lecturer/researcher does not instruct the students via the lecture approach. Students are required to do individual or group research on subjects related to the course requirements. Following the meetings with the students, a consensus is reached on which pages will be included in the newspaper. These pages might be platonism, logicism, formalism, intuitionism, crossword-caricature, interview, book introduction, and art. It is emphasised that each cartoon, news report, and crossword puzzle must link to the philosophy of mathematics. Afterwards, it is learned from the students on which page they want to be a writer. Each group chooses a friend to represent them. It might necessitate putting themselves in unreal positions and responsibilities, (like Moscow Representative, Austria Correspondent, London Reporter, etc.), with the purpose of inspiring/encouraging them and guaranteeing that the output looks like a real newspaper.

The group members brief the representative on their news before the process begins. Each representative announces to all classmate's what kind of news/reports/columns etc. will be on the page belonging to their group. This restrains the same news from appearing on different pages. The groups then divide the duties and begin to write the trends in the philosophy of mathematics. They should update the approaches, views, school of thoughts and perspectives about the philosophy of mathematics by writing in the appropriate news jargon and finding impressive graphics convenient for their news. Thus, students write down philosophical schools about the philosophy of mathematics in the past as if they were daily news. Students might prefer from all the topics they need to learn in the syllabus. A few events from those years can be highlighted in the newspaper to suggest that it is a publication from previous decades. As a result, the possibility of a connection between the lesson and life appears. Representatives present the news on their page to the entire class. By doing this, the problem of unawareness of other advancements in the philosophy of mathematics is bypassed because many students merely focused on their news. At the end, a meeting agenda is held, especially the following topics: The news that should be on the first page, the logo, the headline, the slogan, and the typesetting. The next stage is finding a name for the newspaper. During the meeting, the newspaper's name is chosen, and some sections are rectified as needed. All students have to revise the first edition for typographical, grammatical, spelling, and printing errors. Thus, each participant will be informed again about all sections of the newspaper. The second version is delivered to the learners again, the last adjustments are made, and the newspaper is complete for printing. In brief, one can be able to report the key features of newspaper preparation method as follows:

> It is decided which pages should be in the newspaper; Topics are decided in coherence with the aim, content and, learning outcomes of the course; Students with different abilities are homogeneously split into groups according to the page count of the newspaper so that each group would prepare a different page of the newspaper and each group chooses a representative; Topics are divided into sections by the lecturer according to the page concept; Each group researches the topic they have chosen in detail by sharing tasks; Each student is asked to take a role according to their news (such as Athens' reporter, London representative); The students rewrite the cases and developments in their own words in the

> philosophy of mathematics like a journalist living in the past *(The most important and distinctive aspect of NPM)*; Ensure the groups cooperation as required; Regular meetings are held to discuss about the current situation, things to do, and the impediments; At the end of the study, a concrete product (newspaper) is released; The activity and product are evaluated together with the learners (Koyuncu, 2022a, p. 4).

As is the case in most methods (Koyuncu, 2022a), this method also needs SWOT analysis. Strengths: eradicating stereotypes, boosting motivation, creating a favourable attitude toward the class, making the course fascinating, putting an end to monotony, and making the class entertaining. Weaknesses: it is difficult to improve the newspaper content, and the course duration is insufficient. Opportunities: organisational skills, exploration, computer literacy, taking initiative, reviewing, autodidactic, teaming, taking accountability, authoring, assertiveness, socialising, vocabulary building, lasting learning, paradigm-shifting innovation, self-learning, liberal education, and understanding. Threats: the obstacles in distributing duties according to the field of concern and, additional expenses might arise while it is required to arrange historical visits.

References

Başbay, A. (2005). The Effects of Project Based Learning Approach Supported by Layered Curriculum on Learning Process. Ege Journal of Education, 6(1), Article 1.

Bower, M., & Richards, D. (2006). *Collaborative learning: Some possibilities and limitations for students and teachers* (L. Markauskaite, P. Goodyear, & P. Reimann, Eds.; Vol. 1, pp. 79–90). Australia.

Diffily, D. (2002). Project-Based Learning: Meeting Social Studies Standards and the Needs of Gifted Learners. *Gifted Child Today, 25*(3), 40–59.

Erdoğan, A., Eşmen, E., & Fındık, S. (2016). History of Mathematics in Secondary School Textbooks: An Ecological Analysis. *Marmara University Atatürk Education Faculty Journal of Educational Sciences, 42*(42), 239–259.

Korkmaz, H., & Kaptan, F. (2001). Project-Based Learning Approach in Science Education. *Hacettepe University Journal of Education, 20*, 193–200.

Koyuncu, M. K. (2020). Endüstri 4.0 Çağında Matematik Eğitimi. In M. M. İnceoğlu (Ed.), Endüstri 4.0 (Dördüncü Sanayi Devrimi) ve Eğitim (1st ed., pp. 235–262). Abaküs Publication.

Koyuncu, M. K. (2022a). Is It Possible to Bring the Past into the Present for an Effective History of Mathematics Teaching: Newspaper Preparation Method. *International Journal of Science and Mathematics Education, 1*(41) 62 - 77. https://doi.org/10.1007/s10763-022-10246-w

Koyuncu, M. K. (2022b). Matematik Eğitimi Bağlamında Matematik Tarihi Çalışmalarına Genel Bir Bakış: Bir Meta Sentez Çalışması. *Eğitim Ve İnsani Bilimler Dergisi: Teori Ve Uygulama, 13*(25), 93–122.

Middlecamp, C. (1997). Teaching Stories: Disadvantages of Collaborative Learning. Collaborative Learning (Small Group Learning Page). http://archive.wceruw.org/cl1/cl/story/middlecc/TSCMD.htm#fair

Moursund, D. G. (2003). *Project-based learning using information technology* (2nd ed). International Society for Technology in Education Publication.

Sharan, Y., & Sharan, S. (1990). Group Investigation Expands Cooperative Learning. *Educational Leadership, 47*(4), 17–21.

Taşpınar, M. (2018). *Öğretim İlke ve Yöntemleri* (9th ed.). Pegem Academy Publication.

Winn, S. (1995). Learning by doing: Teaching research methods through student participation in a commissioned research project. *Studies in Higher Education, 20*(2), 203–214.