



**HAL**  
open science

## Doing the time in the mathematics class

Catherine Byrne, Brian Bowe, Michael Carr

► **To cite this version:**

Catherine Byrne, Brian Bowe, Michael Carr. Doing the time in the mathematics class. Eleventh Congress of the European Society for Research in Mathematics Education, Utrecht University, Feb 2019, Utrecht, Netherlands. hal-02409252

**HAL Id: hal-02409252**

**<https://hal.science/hal-02409252>**

Submitted on 13 Dec 2019

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# Doing the time in the mathematics class

<sup>1</sup> Catherine Byrne, <sup>2</sup> Brian Bowe and <sup>3</sup> Michael Carr

<sup>1</sup> Dublin Institute of Technology, School of Multidisciplinary Technologies, Dublin, Ireland;  
[Catherine.byrne8@mydit.ie](mailto:Catherine.byrne8@mydit.ie)

<sup>2</sup> Dublin Institute of Technology, School of Multidisciplinary Technologies, Dublin, Ireland;  
[brian.bowe@dit.ie](mailto:brian.bowe@dit.ie)

<sup>3</sup> Dublin Institute of Technology, School of Multidisciplinary Technologies, Dublin, Ireland;  
[michael.carr@dit.ie](mailto:michael.carr@dit.ie)

*This exploratory study is part of a larger study on assessment and teaching in mathematics classrooms in Irish prison education centers. Our purpose is to enhance knowledge in this field, to enhance practice and to enable better learning and teaching through research. We are using the Mathematics Teaching Triad (TT) theoretical construct for the study. This triad looks at Management of Learning (ML), Sensitivity to Students (SS) and Mathematical Challenges (MC). When finished, this research project will present data derived from a wider investigation, including data from teachers nationwide and data from prisoners attending mathematics classes. This paper analyses the data gathered from a survey on small sample of teachers, covering the time available for mathematics classes, class composition, teacher satisfaction and teacher's identities through metaphor.*

*Keywords: Assessment, mathematics, prison time, metaphor.*

## Introduction and context

### Irish Prison Education

The Council of Europe document *Education in Prison* (1990) states that education of prisoners must “be brought as close as possible to the best Adult Education in society outside” in philosophy and content and that it must “link prisoners to the outside community” (p.14).

Prison education in Ireland is a partnership between the Irish Prison Service and the Education Training Boards (Irish Prison Service 2016). The Joint Strategy Statement states that its aims are to

assist persons in custody to cope with their sentences, to prepare for life after release, to develop an appetite and capacity for lifelong learning and to achieve their full potential as learners. It also aims to promote the importance of prison education. (IPS, 2016, p.6)

So prisoner learners can access similar education and accreditation to learners in adult education elsewhere, through accredited (leading to state certification) and non-accredited courses (not leading to state certification). An adult education approach is followed in prison education which looks at the whole person rather than deficit models, which see the student's weaknesses or mainly as an offender (Warner, 2007).

### Teaching in Prisons

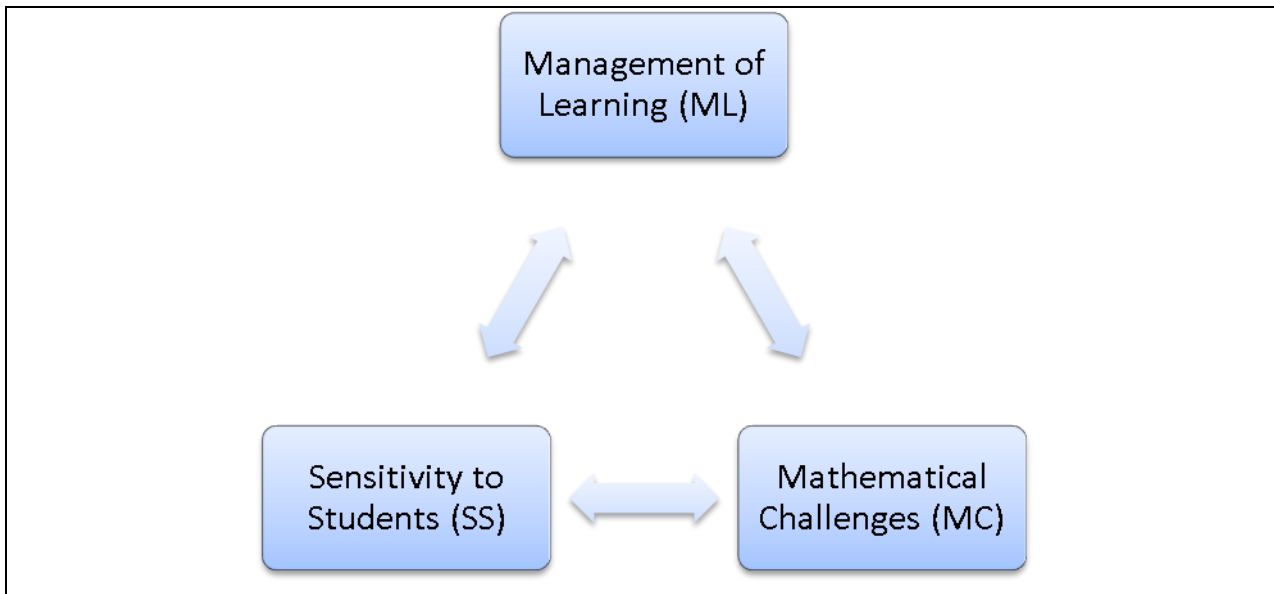
Students entering prison education may have low levels of education (O'Mahoney, 1977; Kett & Morgan, 2003) and a history of negative or disrupted educational experiences (Muth, 2008).

People are motivated to start education in prison for many reasons, including personal development, family and work preparation (Costelloe, 2003). School in prison represents freedom, an escape, a distraction and stops them from sinking (Behan, 2014). They come to have a laugh, make the most of their time, and to learn how to learn (Carrigan & Maunsell, 2014). In prison education they feel trusted (Behan 2014), feel normal and their true selves (Carrigan et al., 2014). The positive feelings of the students seem to have an impact on the teachers. Prison teachers interviewed by Michals (2015) were positive about their work, felt satisfaction and felt that they had learnt from their students. Muth (2008) and Byrne & Carr (2015) state that teachers in prison have noted the transformative nature of prison education, and the growth of their students. This may lead to teachers feeling empowered in the classroom, as Messemer (2013) states that teachers interviewed in US correctional education centers felt they had a strong level of influence to make the necessary instructional decisions in their classrooms. We decided to investigate if there were other reasons for mathematics teacher feeling satisfied in their work. As classes in prison are generally longer than in schools outside, we adapted a study on this topic with mathematics teachers in secondary schools. This found that longer more frequent classes increased teacher satisfaction, which led to increased innovation in methodology and more teaching for understanding (O'Meara & Prendergast, 2018).

### **Why I am doing research?**

Our study is based on the Jaworski Teaching Triad (Jaworski, 1992) which has three components, the Management of Learning (ML), Sensitivity to Students (SS) and Mathematical Challenges (MC). We chose this because it offers a framework for all the proposed data from this study, both qualitative and quantitative. ML refers to the role of the teacher in the classroom learning environment. In this context this refers to groupings, timetable, resources, interactions. Sensitivity to Students (SS) describes the teacher's knowledge of the learners, attention to their needs, affective, cognitive and social. In this context it describes the engagement with students, from the point of entry. Mathematical Challenges (MC) describe the challenges offered to the learners to help them develop mathematical thinking through tasks, questions and reflections, in accredited and non-accredited tasks.

The domains are interlinked and interdependent. A balance between SS and MC is needed to enable teaching to take place. In prison education there could be a risk of too much SS, due to vulnerability of learners, and too little MC which could mean strong relationships in class but little mathematical progression. Too much MC and too little SS could cause stress to an already traumatized and stressed group. Harmony leads to achievement when there is a balance between challenge, support and stimulation. The results from the teachers (see below) show their SS, ML MC.



**Figure 1: Teaching Triad, Jaworski, B. (1992)**

The prison education center is where two cultures collide, the culture of the classroom and the prison (Wright, 2005). There has been very little research on the everyday experience of prison education internationally, so we decided to gather data on the practices and rationale. We built this study on previous studies of mathematics teachers, in Ireland, Finland and Switzerland. O’Meara & Prendergast (2018) investigated the length of mathematics classes and the impact on teacher satisfaction. Oksanen & Hannula (2013) used metaphor to explore mathematics teachers’ beliefs about their profession and Beeli-Zimmermann (2014) explored adult numeracy teachers’ beliefs.

We distributed the survey by email after a discussion with each teacher. During the call, the rationale for the study was given and the invitation was issued to take part. All who were contacted responded. We will extend the study nationwide in future.

The questions are divided into two types; quantitative information on the class structure and allocation and qualitative questions on the teachers’ identity using metaphor (Table 1).

1	How long are mathematics classes in your center?
2	How often can people attend mathematics?
3	How satisfied are you with this?
4	How many students are in your mathematics classes
5	Are students of similar or mixed ability?
6	Do you like teaching mathematics?
7	What metaphor describes you as a mathematics teacher?
8	Please explain

**Table 1: The survey for prison mathematics teachers**

The O'Meara & Prendergast (2018) study is interesting because it showed that mathematics teachers in secondary schools were more satisfied with longer and more frequent mathematics classes. Classes in prison are longer so we wanted to investigate the impact of the longer class time on the satisfaction of prison mathematics teachers. Teachers' beliefs can shape their actions, and this could have an effect in prison education, where teachers' values may differ from the prison culture (Wright, 2005). So, we decided to evaluate how mathematics teachers in prison felt about their work as this can impact on their teaching Beswick (2011). We are interested in doing this research because there is a lack of research in the field of prison mathematics education. After teaching for many years in this sector, I felt it was timely to investigate it.

### **What am I doing?**

So, we developed a survey for teachers of mathematics in prison center, based on other studies and issued it to a pilot group of mathematics in prison. We intend to involve a wider group in future. The survey has quantitative and qualitative parts: the quantitative part investigates the timetabling, the composition and the access to mathematics classes. The qualitative part used metaphor to assess teachers' identity and feelings about their work through metaphor. We will analyze this data using a framework such as Linguistic Metaphor Identification (Steen 2010). This was originally planned as an online survey, but these can be problematic in the prison context, so we simplified it and used email. Five emails were sent and five responded.

There is a small number of responses for several reasons. There is a small number of mathematics teachers in the Irish prison education system. There are 13 centers in total and all have at least one teacher, either part time or full time. This data will be part of the next stage in this study. It is a subject with relatively low participation rates, which will be investigated in the next stage of the research. This is the first stage of the research and in the next stage, further data will be gathered from the remaining mathematics teachers in Irish prisons. The final stage of the project will consist of surveying the students attending mathematics classes in prison.

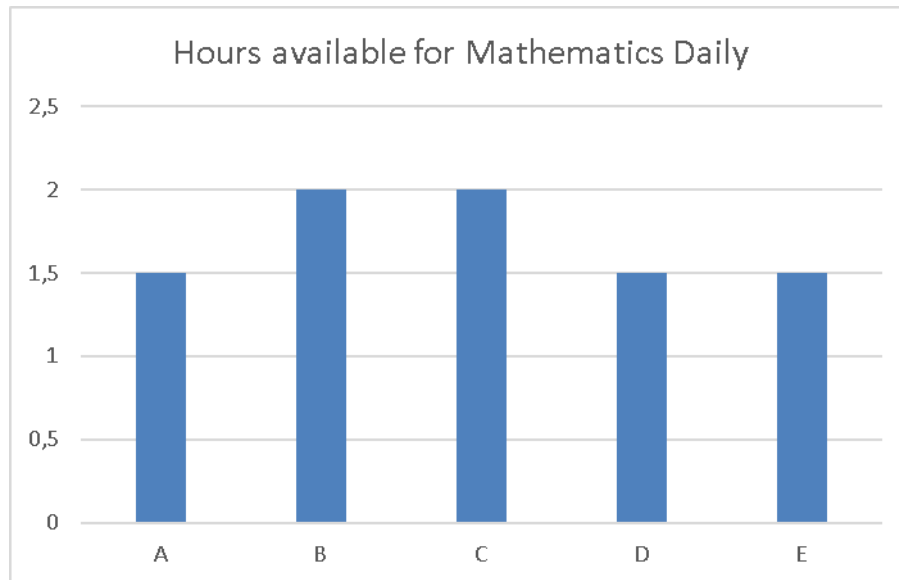
There is often conflict over mathematics, mathematics or numeracy (Kaye, 2015) and the discussion is beyond the scope of this paper. This paper uses the term mathematics, as that is the term used widely in prison education by teachers and students.

The research questions in this study are:

- (1) Are long mathematics classes common practice in Irish prison education centers and how often can students attend?
- (2) Is there a link between teachers' level of satisfaction to the availability of mathematics classes?
- (3) How do Irish mathematics teachers in prison see their identity?

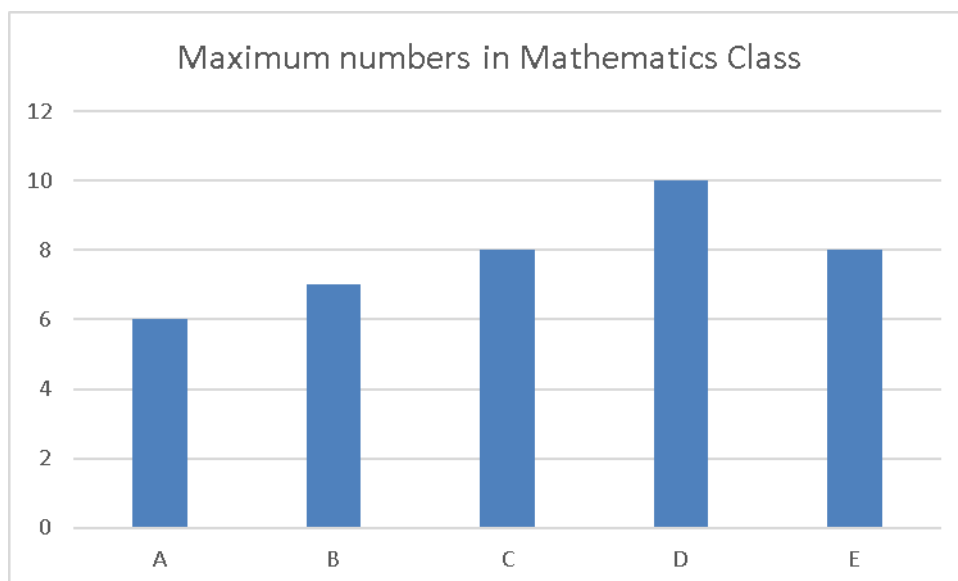
## Results

The quantitative data was analyzed using Excel. Teachers surveyed stated that their mathematics classes varied between 1.5 and 2 hours long (Figure 2). They also stated that students could enrol in as many classes as they wished each week. All teachers stated that they were satisfied with this.



**Figure 2: Hours available for Mathematics classes in prison education centers daily**

We found that mathematics classes in prison were longer, at least one hour (Figure 2). Students could come more often if they wished; all levels and abilities attend at the same time, so students could join classes with people they choose to learn with.



**Figure 3: Maximum numbers attending mathematics classes in prisons surveyed**

In Figure 3, the numbers attending range from 1 to 10 and one respondent was unhappy with the low numbers. 10 is the maximum number in any class according to the respondents.

Students worked individually within the group as all were at different levels and the teachers respected and protected their privacy. This mixture in the class was a challenge at times and took a toll on teachers, in terms of emotional and physical energy, according to some respondents.

A challenge that teachers felt in this context was getting more students to class, as they knew there were many who were not coming to school or who were in other classes but had not enrolled in mathematics yet. They also felt that the students were anxious at the beginning so had to work individually rather than in groups as at the start, they were afraid to let others see where they were at. Some teachers were the only mathematics teacher in their center, some were part of a team in their center.

In response to the question “Are students of mixed ability?” all teachers stated that all students are mixed level. Teachers were asked: “Do you like teaching mathematics in prison?”

Those surveyed all said they enjoyed teaching mathematics in prison and seeing their students grow in confidence and in skills. Teachers stated:

“I enjoy it”

“I love it”

“I like it”

“Yes, I love teaching mathematics ...to see a student’s absolute pleasure at reaching their target.”

Responses to the question “What metaphor describes you as a mathematics teacher?” ranged from “bit of everything” (2 responses) to “facilitator”, “member of a band” and “jazz musician” and “juggler” and “bridge builder” and “breaking down barriers”. Teachers stated that they wanted to ensure students had a positive experience and would return to mathematics class the next day, so adapted their behavior according to the needs of the students during each class. These teachers see themselves in different ways, as facilitators of the group, as led by the group and as a mixture of both. Oksanen & Hannula (2013) stated that in their findings teachers saw themselves in five categories: subject specialist, pedagogue, didactics expert, self-referential and contextual metaphors. We will develop our coding into categories in the future wider study.

As part of my own reflective practice, I picked a metaphor which I felt represented my work as a teacher of mathematics in prison. I feel that I am a tightrope walker, balancing on a fine line in class between challenging my students with mathematics, being sensitive to them and managing the learning while keeping an eye out for risks.

## **Discussion**

There were many findings from this initial stage of gathering the research. Looking at the data from teachers, they had long mathematics classes of and mixed levels and were generally satisfied with the amount of time students could access classes. They were concerned that so few came to mathematics class. Teachers showed flexibility of approach in their use of words related to their management of learning, such as juggle, rotate, flexibility. Their actions showed a tolerance and

acceptance of where the students were at. The irregular attendance, mixed ability groups, different groups, different class lengths, and frequent breaks during class allowed the students to feel comfortable and enjoy being mathematics class. These factors presented a challenge to teachers at times. Teachers showed an awareness of the role of emotions in mathematics class and noted that they allowed respect and privacy to students, offered individualized teaching within the group. They saw their role as breaking down barriers around learning mathematics and acknowledged that learning is challenging. Teachers expressed their pleasure at seeing student reach their target and acknowledged the difficulties they had in their mathematics learning histories.

## References

- Beeli-Zimmermann, S. (2014). Beyond questionnaires: Exploring adult education teachers' mathematical beliefs with pictures and interviews. *Adults Learning Mathematics*, 9(2), 35-53.
- Behan, C. (2014). Learning to escape: Prison education, rehabilitation and the potential for transformation. *Journal of Prison Entry and Reentry*, 1(1), 20-31.
- Beswick, K. (2011). Knowledge/beliefs and their relationship to emotion. In K. Kislenko (Ed.), *Current state of research on mathematical beliefs XVI: Proceedings of the MAVI-16 conference* (pp. 43-59). Tallinn, Estonia: Tallinn University.
- Byrne, C. P. & Carr, M. (2015). Maths in prison. *Journal of Prison Education and Reentry*, 2(2), 33-37.
- Carrigan, J., & Maunsell, C. (2014). 'Never really had a good education you know, until we came in here': educational life histories of young adult male prisoner learners. *Irish Educational Studies*, 33(4), 399-417.
- Council of Europe. (1990). *Education in prison: Recommendation No. R(89)12 of the committee of ministers to member states on education in prison*. Strasbourg, France: Council of Europe.
- Department of Education and Skills. (DES). (2010). *Report of the project mathematics implementation support group*. Retrieved from <https://www.education.ie/en/Publications/Policy-Reports/Report-of-the-Project-Maths-Implementation-Group.pdf>
- Irish Prison Service. (2016). *Joint IPS/ETBI education strategy 2016 – 2018*. Retrieved from [http://www.irishprisons.ie/wp-content/uploads/documents\\_pdf/education\\_strategy\\_2016.pdf](http://www.irishprisons.ie/wp-content/uploads/documents_pdf/education_strategy_2016.pdf)
- Jaworski, B. (1992). Mathematics teaching: What is it. *For the learning of Mathematics*, 12(1), 8-14.
- Kaye, D. (2015). What do we teach? Mathematics, numeracy, or maths?. In A. Hector-Mason & S. Beeli-Zimmermann (Eds.) *Adults learning mathematics: Inside and outside the classroom. Proceedings of the 21st International Conference of Adults Learning Mathematics: A Research Forum* (pp. 141-149).
- Messemer, E. (2013). The level of influence that six dimensions have on teacher decision-making in the correctional education classroom. *International Journal of Humanities and Social Science*, 3(13), 8-19.



- Michals, I., & Kessler, S. (2015). Prison teachers and their students: A circle of satisfaction and gain. *Journal of Correctional Education*, 66(3), 47-62.
- Morgan, M., Kett, M. (2003). *The Prison Adult Literacy Survey: Results and implications*. Dublin, Ireland: Irish Prison Service.
- Muth, B. (2008). Radical conversations: Part one social-constructivist methods in the ABE classroom. *Journal of Correctional Education*, 59(3), 261–281.
- Oksanen, S., & Hannula, M. S. (2013). Finnish mathematics teachers' beliefs about their profession expressed through metaphors. In M. S. Hannula, P. Portaankorva-Koivisto, A. Laine, & L. Näveri (Eds.). *Current state of research on mathematical beliefs XVIII: Proceedings of the MAVI-18 Conference*. Helsinki, Finland: Suomen ainedidaktinen tutkimusseura ry.
- O'Mahony, P. (1997). *Mountjoy prisoners: A sociological and criminological profile*. Dublin, Ireland: The Stationary Office
- O'Meara, N., & Prendergast, M. (2018). Time allocated to mathematics in post-primary schools in Ireland: are we in double trouble? *International Journal of Mathematical Education in Science and Technology*, 49(4), 501-516.
- Steen, G. J., Dorst, A. G., Herrmann, J. B., Kaal, A., Krennmayr, T., & Pasma, T. (2010). *A method for linguistic metaphor identification: From MIP to MIPVU*. Amsterdam, The Netherlands: John Benjamins.
- Warner, K. (2007). Against the narrowing of perspectives: How do we see learning, prisons and prisoners? *Journal of Correctional Education*, 58(2), 170-183.
- Wright, R. (2005). Going to teach in prisons: Culture shock. *Journal of Correctional Education*, 56(1), 19-38.