JOURNAL OF PHYSICS AND CHEMISTRY

Research Article

Volume 3| issue 2

The Contribution of Promotion Computational Thinking to Using Mathematical Reasoning Knowledge In Prospective Teachers Training to Promote Necessary Pedagogical Knowledge To Use In Promoting Student Learning

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Submitted: 11 Nov 2025 **Accepted:** 12 Nov 2025 **Published:** 17 Nov 2025

Citation: *Ana Henriques (2025) The Contribution of Promotion Computational Thinking to Using Mathematical Reasoning Knowledge In Prospective Teachers Training to Promote Necessary Pedagogical Knowledge To Use In Promoting Student Learning J of Physics & Chemistry.3(2) 1-4.*

Abstract

This paper reports the necessary innovation promotion of knowledge Mathematical Reasoning highlighted in curricular orientations learning of prospective teachers(PTs) experiment in analysis course to develop and provide the successful analyze development of university students skill in the teaching and learning of Mathematical Reasoning processes that requires a deep understanding of concept and practice in exploration research tasks to understand these potential in promoting students. These results study follows a qualitative and interpretative data analysis based on PTs studies participated in theoretical didactic training and data collection to understand positive contributions of adopted principles and planned learning situation based on prepared tasks in pairs including participative observation of students written reports and interviews. The results show that the investigation contribute to promote the development of PTs knowledge and understanding they perceptions about the positive contribution of mathematical reasoning to providing them opportunities to promote students experience several mathematical processes, including posing questions, formulating and testing conjectures, generalizing and proving results was assumed as pertinent to carry out this study, reported in this paper.

Keywords: Mathematical Reasoning; prospective teachers education; Pedagogical knowledge; Design principles.

Introduction and Literature Review

With the aim of supporting the successful development of prospective teachers in international practices to engage and promote mathematical reasoning. That is widely recognized in current international curriculum as an essential skill to develop students to successful learn mathematics include organization and the opportunity to experiment with plans that enable the development of classes centered on tasks [1]. In this context was recognized as an effective participation resource for formative assessment that It is required an innovation of theoretical and didactic training pedagogical practices to develop students' mathematical learning [2]. Thus, it is essential that the initial training of mathematics teachers adopt the mathematical reasoning (MR) for an adequate formative assessment, promoting their knowledge about the mathematical tasks worked to support students' learning in their future teaching practices.The selection of different tasks to be included in the MR, present what it was asked to do, its resolution which should constitute a representative set of their best work carried out on the topics studied throughout the training, and taking into account what they consider to be a contribution to their learning; and a reflection justifying the reasons for its choice for inclusion in the MR, the procedures adopted for a good performance, the reformulations carried out to improve some version of work after feedback. The goal of challenging students to make conjectures is not just to get them to talk mathematics; they should formulate conjectures that allow them to learn new mathematics [3]. The development of students' RM emerges as a central aspect in curricular guidelines at all levels of education (NCTM 2007) mathematical reasoning in the exploration of research tasks. Conjectures stand up to testing and gain credibility by stimulating formal arguments and proofs that give mathematical validity. Justification is a central element in mathematical reasoning and involves several important components including creating arguments and understanding definitions Presentation to share the results of the problem-solving process problems conjectures

and justification of mathematical reasoning in the exploration of research tasks stand up to testing and gain credibility by stimulating arguments and formal proofs that give mathematical validity and involves creating arguments and understanding the definitions and several important components of the problem-solving process The students learning depends on the experiences that teachers provide them in lessons Research tasks constitute a fundamental context for the study of mathematical reasoning, taking into account the processes that are associated with them The mathematical reasoning widely used in education with distinct The activities promoted by the PTS depend on their ability to develop future practices that promote students' RM" [4-8]. For students to have the opportunity to develop their mathematical reasoning, it is essential to continually create and maintain a classroom culture where they engage in RM processes in conjunction with problem solving, communication and argumentation of mathematical representations, which stand out the most, which are fundamental to helping students understand mathematical concepts and ideas. This reasoning thus becomes central to school mathematical activity due to its functions of validating knowledge, valuing its configurations reasoning Mathematical involves a variety of processes of establishing resolution strategies, generalizing, conjecturing, comparing, classifying, validating, justifying, demonstrating and exemplifying the relevance of certain mathematical topics, often based on schemes or drawings called by [9].

Methodology

This study is pertinent to adopted understand whether and how a training experience was realized in a pre-service teacher education carried out involving 10 participants (male and female) of the 3rd cycle and secondary education that were enrolled in mathematics teaching as a strategy to teach and learn and prospective teachers were asked to plan and teach a class cantered on tasks that promotes mathematical reasoning, and a collaborative approach was considered in carrying out the teaching experience with classroom exploration of 3rd cycle elementary school classes or. high school. This experience allowed PTS learning opportunities to qualitative analyse pedagogical curricular aspects, understand the planning and reflection on a class content and forms of assessment of students, as well as their knowledge. Finally, the teaching action of future teachers enabled clarification and provided improvements in the planning of subsequent lessons to promote MR of students.This research follows a qualitative and interpretative nature (Bogdan & Biklen, 1994) aiming to understand the prospective teachers perceptions about the positive contribution of Mathematical reason Data collection and analysis included questionnaire, interview, participant observation and written work on the proposed tasks based on mathematical reasoning which consists of making justified inferences, that is starting knowledge of existing information to obtain new conclusions, at new knowledge, in a justified way, based on mathematical ideas. The PTs engagement in analysing mathematical tasks focus on reasoning and teacher actions to promove processes to sharing interpretations of evidenced MR processes. It is highlighted in the training experiences that the sessions: follow an exploratory approach, assume a predominantly interventionist character, supported by theory, and approach teaching experiences involving: planning and teaching processes; and reflection on learning The discussion of texts of a more theoretical nature was preceded by prior reading by the FP in autonomous work, guided by a script proposed by the trainers. The discussion took place in a large group, seeking to systematize the main ideas. Texts were discussed, each with a different focus, as shown in Table 1 Regarding the training tasks, the PTs that aimed at autonomous resolution and collective discussion included questions that encouraged or requested the exploration of valid mathematical tasks and justifications that they had carried out to become aware of their potential and sessions were proposed that integrated the use of resources. technological training tasks are shown in table 1.

Table 1. tasks solved by Pts in MR Research data.

Level	Descrição		
	Nature of the argumente	**Properties/Procedures**	**Degree of generalization**
EG3	Based on the correct geometric structure of the family of figures	Makes relevant and established properties explicit	Uses generic language about the family of figures
			Focuses on a generic example
			It affects one or more family figures without generalizing
EG2	Based on the incomplete geometric structure of the family of figures	It makes relevant and established properties explicit but omits others	Uses generic language about the family of figures
			Focuses on a generic example
			It affects one or more family figures without generalizing
EG0	using the geometric structuring of the family of figures	Explains numerical relationships without relating them to the structure of the figures	It affects one or more family figures

In the following chapter is presented some results of the data analysis, focus on the mentioned established questions, based on exemplified excerpts from the PTs work developed in their documents descripted, the resolution of mathematical reasoning in mathematics education as they participated in this study voluntarily. But the used names of PTs were fictitious, used by numbers, in order to guarantee ethical issues.establishing opportunities for FPs to develop their mathematical and didactic knowledge and recognize how they can apply to promoting students' mathematical reasoning.

Results

In particular the assess of PTs perceptions of using Mathematical learning and reflection on the contribution of this resource and possible use in students teaching practices regarding the work carried out in the training session, where the obtained responses of the participants in pairs to know how developed their work and what domains they recognized and satisfaction in the development of this training I highlight the importance of the materials made available to clearly develop the stages of mathematical reasoning which prove to be useful in mathematical learning and I believe I managed to answer the questions correctly, and also I emphasize the importance of analyzing the students' resolutions that allowed me to identify and created the answers given and those that will be adequate (PT1, PT3) The opportunity to have contact with RM and know how it works, I believe that this possibility is important to keep students motivated from traditional teaching who like these tools and reflection and currently being an important formative assessment. It was important to learn how to adapt the completion of tasks that promoted my learning, leaving me confident in understanding what is intended to give appropriate mathematics lessons to students to help them improve.(PT2, PT6).

I chose the important tasks and Raciocinar matematicamente consiste em fazer inferências justificadas, ou seja, partir do conhecimento prévio de informação existente para obter novas conclusões chegando a conhecimento novo, de uma forma justificada, com base em ideias, propriedades ou definições matemáticas. E o RM pode ser tipificado de forma diversa, estas inferências podem ser de natureza dedutiva, no tão aclamado tipo de raciocínio dedutivo ou lógico, mas podem também ter uma origem indutiva ou abdutiva espera-se que as generalizações formuladas sejam justificadas e validadas com base em propriedades, procedimentos ou ideias matemáticas,(PT10)

In order for students to have the opportunity to develop their mathematical reasoning, it is essential to continually create and maintain a classroom culture where they engage in RM access processes in conjunction with problem solving that is most prominent and fundamental to understanding. of mathematical concepts and ideas, when the different representations are worked on and articulated.(PT4, PT9)

Um dos principais suportes para promover o desenvolvimento do RM, é que na sala de aula sejam propostas tarefas adequadas, apoiadas por ações do professor. As tarefas para promover o desenvolvimento do RM dos alunos na sala de aula têm por base os seguintes princípios de design: em termos gerais, as tarefas exploratórias e de investigação (PT5).

Eu considero que as experiências apresentadas evidenciaram bem o desenvolvimento do RM dos alunos que depende das atividades práticas dinamizadas pelos professores na sala de aula. essencial para apoiar a necessária adequada aprendizagem dos alunos com sucesso/compreensão (PT7).

In my view after informação recorrendo predominantemente ao raciocínio dedutivo I conclude tasks I will manage very well identificando a noção de inferência lógica, é frequentemente considerado como o paradigma da matemática caracterizado pela certeza referente à relação necessária entre as premissas e as conclusões (PT8, PT6).

Promover a generalização dos alunos é fundamental pelas minhas potencialidades da aprendizagem do raciocínio matemático pois este processo é a base de minhas muitas ideias e conceitos válidos (PT1O).

Conclusions and Discussion

To conclude this study carried out in the context of initial training experience aiming to understand the prospective teachers perceptions about positive contribution of their mathematical reasoning use They carry out significant learning and revealing interest in providing work of MR that allow to develop perceptions and to reassure the adequacy of the tasks they had studied they also make explicit the intention and possibility for improving processes of teaching practices, and assessment to promote students' mathematical learning when it favors possible use in future teaching practices In this view I infer that the research contributes to consolidating the importance of training process to enable professional learning opportunities in mathematics Another conclusion is that this training experience consolidated the PTs conceptions being more favorable to integrating MR in the teaching and learning.

Finally this carried study assigns the characteristics of initial training models which can contribute to consolidating the importance of the better training process to enable PTs to promote professional learning in training assessment and improvement of students' mathematics learning, to bring them closer to the expected reality of their future practice of students at all levels of schooling And provide new elements to guide the scientific and educational community to identify and understand the adequacy and potentialities of these principles for professional learning of future teachers This work can be published by the International Journal of Science and Mathematics Education The experiences/ ideas presented clearly demonstrated the development of PTs in the practical activities of initial training, which contributes to what to do to emphasize RM in classroom practices. To contribute with an innovative and specific way of developing this knowledge of RM and the processes involved in PTS in the context of initial training, salient activities are presented that may be useful to the mathematics education community.

Finally,This carried work based on the obtained results of this

study evidence the characteristics of the training experience allowed the PTs to explore analysis of mathematical tasks for develop important MR Knowledge adequated to learning and integrate in future practices[10,11].

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