

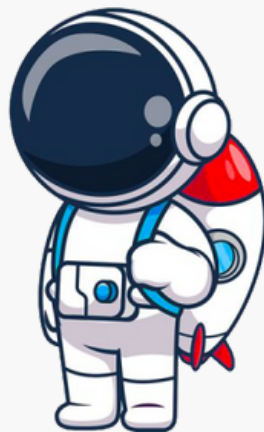


HELMETO 2023

UNIVERSITY OF FOGGIA

5th International Conference on
Higher Education Learning Methodologies and
Technologies Online

Foggia, September 13th - 15th, 2023

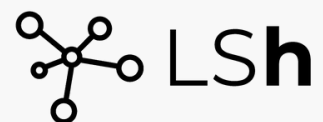


BOOK OF ABSTRACTS



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The 5th International Conference on Higher Education Learning Methodologies and Technologies Online (HELMeTO2023) confirmed a growing interest in the topics of higher education learning methodologies and technologies, as well as the relevance of the interdisciplinary approach that characterizes our community.

This increased interest drove us to translate the HELMeTO event from a workshop to a conference (for the second year), hosting a higher number of contributions from several countries and bringing a more international perspective on the topics. During the presentations and talks, it became clear that there is a complex relationship between technology and pedagogical approaches. These discussions also brought up new emerging topics, such as the potential role of learning analytics, artificial intelligence, augmented and virtual reality, and big data analytics. Additionally, the importance of tutorship and learning design in online learning was emphasized.

The Department of Humanities at the University of Foggia hosted the 2023 edition of HELMeTO. This was the second in-person event since HELMeTO 2020 and 2021 were conducted fully online due to the Covid-19 pandemic. We received 108 submissions from over 313 authors and 19 countries (Algeria, Brazil, Croatia, Estonia, Germany, Italy, Japan, Latvia, Malta, Morocco, Netherlands, Poland, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom), thus confirming the growing interest from the scientific community in the conference and its international scope.

The 2023 edition of HELMeTO featured dozens of high-quality contributions spread across 11 special tracks and two general tracks. This volume provides an overview of the current international context of online learning. Theoretical approaches, technologies, and practical cases are covered in-depth, making it a valuable resource for scholars and researchers interested in online learning and the future of education from pedagogical and technological perspectives.

This editorial does not aim to systematically review every publication but rather provide a general overview of each track, assisting readers in deciding what to pursue further. To this extent, *General Track 1* is focused on “*Online pedagogy and learning methodologies*”. It presents how to design a survey, how to implement social learning for professional development, the outcome of using a machine-learning app on peer assessment, and the after-effects of COVID-19 in Higher Education.

General Track 2 is focused on “*Learning technologies, data analytics, and educational big data mining as well as their applications*”. It presents predictions both in course quality and in students’ success. It also presents analytics on a specific MOOC and on university data cultures, as well as a deep analysis of digital tools and the related roles.

Special Track 1 is focused on “*Smart Systems for context-aware Education*”. It aims to create a platform for discussing the latest research trends and applications of smart systems integrated with artificial intelligence approaches for context-aware education. It provides an opportunity for instructors, researchers, instructional designers, and administrators to identify and discuss new and promising research directions in this challenging field.

Special Track 2 is focused on “*Emotions and art in higher distance education*”. It aims to collect and analyze eLearning practices that focus on the role of emotions in university courses. It invites teachers and researchers to reflect on the relationship between emotions, community building, and art, and to reconstruct teaching methods and participatory mechanisms that clarify this relationship. Specifically, the track focuses on the following aspects: emotional presence in building an online learning community, aspects of interaction (such as emotional intelligence, empathy, and affect), emotional responses experienced in an e-learning environment, and the effects of emotional presence on disciplinary knowledge.

Special Track 3 is focused on “*Performing art-based methodology to improve online learning experiences*”. It aims to investigate how a specific laboratory teaching experience, which is conducted remotely and focuses on performance, can impact the perception of the empathic relationship, learner interaction/engagement, and the perception of non-verbal cues such as body language, gaze, and tone of voice. These factors are crucial to establish a meaningful teaching process that promotes participatory online learning experience, emphasizing a shift from a mere "experience-of" some object to an "experience-with" that involves active engagement and collaboration among learners.

Special Track 4 is focused on “*E-learning for providing “augmented” mathematics education at University level*”. The use of technology, especially the internet, cannot be overlooked in any aspect of modern life. In the field of education, students naturally turn to digital resources like videos, tutorials, and mathematical software. This poses a challenge for university teachers to create new learning environments that integrate both traditional and digital resources, and utilize them to enhance students' learning experiences. It is important to explore how technology can be leveraged to create new and innovative teaching methods that provide students with augmented learning experiences.

Special Track 5 is focused on “*Supercyberkids! The importance of promoting cybersecurity education among teacher education students*”. It aims to facilitate the exchange of research results, experiences, and products related to cybersecurity education in primary school settings, including teachers and parents. Its ultimate goal is to explore new ideas and trends in gamification platforms and specific games related to cybersecurity, with a focus on teacher education and professional development as a reference context.

Special Track 6 is focused on “*Effects of high-performance artificial intelligence systems and immersive technologies in education*”. It aims to discuss the impact, potential, viewpoints, merits and drawbacks of both high-performance AI systems and immersive technologies in the field of education. It includes contributions related to the impact of new AI systems on education, novel artificial intelligence systems to bolster education, the use of readily available AI systems for education from the perspective of students and teachers, supportive AI for creating XR scenarios, XR in education and teaching.

Special Track 7 is focused on “*The future of learning: Exploring the intersection of posthumanisms, e-health, technologies, and artificial intelligence in education innovations*”. This track covers new research directions in e-health education, including virtual reality, gamification, mobile health, and personalized healthcare. It also explores the challenges and opportunities of integrating e-health technologies into clinical practice and the ethical considerations of using them. Additionally, it addresses health equity and implementation of e-health education interventions in diverse settings.

Special Track 8 is focused on “*Technology-based learning interventions in higher education for combating inequalities and increase the psychological well-being of youngsters*”. The purpose of this special track is to gather reflections, best practices, and experiences related to the use of serious games and digital interventions in higher education. The goal is to ensure inclusive environments for youngsters that help improve their well-being, combat inequalities and promote psychological wellness.

Special Track 9 is focused on “*Innovative inclusive university*”. It aims to encourage discussions, sharing of best practices, and personal experiences regarding the latest teaching methodologies that promote inclusion in higher education. This track puts emphasis on the use of new technological tools that support truly inclusive teaching.

Special Track 10 is focused on “*Beyond borders: exploring immersive environments and new didactic approaches in higher education*”. The aim and scope of this track are to identify the key elements that arise from studying immersive reality in higher educational contexts. Additionally, it aims to develop innovative teaching models and approaches for higher education students and lifelong learners, while exploring theoretical and practical settings for the construction and management of knowledge. Finally, the track aims to stimulate interdisciplinary discussions on the topic.

Finally, *Special Track 11* is focused on “*Learning technologies and faculty development in the digital framework*”. It addresses two main areas of interest, namely: online or blended approaches to academic/faculty development, and how faculty development can enhance teachers' skills to design, implement, and assess learning in a higher education digital environment. The track features research, best practices, and experiences related to online or blended initiatives for faculty development, as well as papers on topics such as the promotion of academic staff profiles and skills development in the digital environment. These topics include learning design, curriculum design, teaching methodologies, assessment, digital publishing, open science, online learning, e-mentoring, e-tutoring, digital skills, and related topics.

In summary, this book of abstracts provides a comprehensive overview of the methodologies and technologies used in online learning in higher education. This has been the focus of HELMeTO since its first edition. The book brings together

theoretical concepts and practical experiences related to online technologies and learning. It is a valuable resource for anyone interested in this field.

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GENERAL TRACK 1

“ONLINE PEDAGOGY AND LEARNING METHODOLOGIES”

A lost historical approach to Calculus: An interactive and multitouch app for tangent problems

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1 Introduction

Calculus marked an epochal change in the evolution of scientific thought. However, this subject poses several difficulties: researchers in mathematics education highlighted obstacles and proposed different approaches in this field of mathematics [9]. We think that a fruitful perspective can be rooted in the history of mathematics and scientific instruments. Indeed, we retrace the first approach, due to Leibniz, to the “inverse tangent problems” (nowadays lost, after the XIX century arithmetization of the calculus). Within this perspective, we implemented and provided an interactive and multitouch app for tangent problems, linked to the everyday experience of students. We adopted this app for short workshop activities involving University students, with the future purpose of testing it in lower grades.

2 Mathematical machines for inverse tangent problems

The use of material and digital technology in mathematics education is increasingly widespread. Among material artifacts, mathematical machines have been studied in various teaching experiments. On the other hand, the development of digital technologies opened up questions and new perspectives for research [2].

Geometric constructions have been digitally implemented in Dynamical Geometry Systems (DGS) as GeoGebra. However, also DGS do not allow purely geometrical constructions for Calculus; for example, one can trace curves like the exponential only by formulas. To start overcoming these limits, we propose a geometric/mechanical insight based on the resolution of the “inverse tangent problems” (to construct a curve given the tangent properties). In the real world, to guide the tangent in order to construct new curves, a strong insight can be a wheel rolling perpendicular to the plane of the curve: the direction of this wheel will be the tangent to the curve traced by the contact point between the wheel and the plane.

Concerning the design of the proposed app, we propose a multitouch interactive app for tablets, aimed to experience the construction of the tangent to a given curve, by linking the wheel direction to the tangent concept.

Our aim is to make the student construct and/or reinterpret the tangent concept as the limit of the secants, by making different figures rolling along the curve (Fig. 1).

The richness of such an approach is that, besides solving the direct tangent problem (given a curve, to find its tangent), such a tool can be used to guide the direction of a

curve to-be. That means that, by guiding the wheel, one can construct derivatives and primitives given the graph of a function and geometrically solve differential equations. Such an approach is the geometrical counterpart present at the basis of Leibniz's conception of Calculus [3, 8, 10]. The app is designed to allow the change of the curve (smooth or not) and the wheel (a regular polygon with a growing number of edges or the limit circle). In a DGS like GeoGebra [4, 6], it is possible to dynamically guide the wheel by introducing two sliders. (Note that it does not suffice to drag the wheel because one has to guide both its position and direction.) That means that, even though the user can move the wheel along a path, that happens in a clumsy way. Differently, the multitouch function in our app introduces the use of two fingers to move the wheel, permitting to move the wheel (both in position and direction) in a native and natural way.

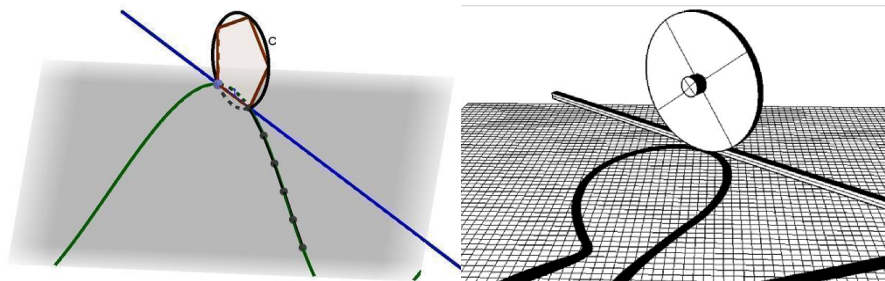


Fig. 1. Left: Considering a regular polygon rotating along a curve, by increasing the number of the sides we can imagine that the direction of the rolling wheel is the tangent as the limit of the secants. Right: Considering a wheel rolling on a curve, the direction of the wheel (in the image represented by a bar) is the tangent to the curve.

3 Methodology

We organized several activities involving University students to test the app and its design. The current version of the app cannot yet be used as a stand-alone tool but requires the mediation of researchers. They have to propose the didactics activities with the app and to orchestrate the related discussions [1, 4]. The aim of the activities is to make students grasp the idea of tangent as a ground to achieve further fundamental Calculus concepts through a hands-on approach linked to their everyday experience and previous mathematical knowledge. Therefore, we proposed the use of the app to small groups of students (around two to three people) and in presence of the researchers [4]. Further research will focus on the didactics consequences and how this app can become a useful tool to build elementary concepts of Calculus, in continuity with the historical approach by Leibniz and the research on micro-straightness [7]. Besides being a helpful support for more complex contents (e.g. derivative-primitives, differential equations [5]), we hypothesize that our digital tool can also provide an introduction to Calculus, even in lower grades.

Acknowledgments

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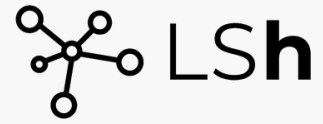
References

1. Albano, G., Dello Iacono U., Fiorentino G.: An online Vygotskian learning activity model in mathematics. *Journal of E-Learning and Knowledge Society* 12(3), 159–169 (2016).
2. Borba, M., Bartolini Bussi, M. G. (eds.): Historical aspects of the use of technology and devices in ICMEs and ICMI. *ZDM The International Journal on Mathematics Education*, 42 (1) (2010).
3. Bos H. J. M.: Tractional Motion and the Legitimation of Transcendental Curves, *Centaurus*, 31(1), 9–62 (1988).
4. Bussi, M. G. B., Mariotti, M. A.: Semiotic mediation: From history to the mathematics classroom. *For the learning of mathematics*, 19(2), pp. 27-35 (1999).
5. Crippa, D., Milici, P.: Transcendental curves by the inverse tangent problem: Historical and didactical insights for calculus. In: Barbin, E., Capone, R., Fried, M. N., Menghini, M., Pinto, H., Tortoriello, F. S. (eds.). *History and Epistemology in Mathematics Education - Proceedings of the 9th European Summer University*, pp. 181–193 (2023).
6. Di Paola, B., Manno, G., Scimone, A., Sortino, C.: *La Geometria, una guida ai suoi contenuti e alla sua didattica*, Palumbo, Palermo, (2007).
7. Maschietto, M.: Graphic calculators and micro-straightness: analysis of a didactical engineering. *International Journal of Computers for Mathematical Learning*, 13, 207–230 (2008).
8. Milici, P.: A geometrical constructive approach to infinitesimal analysis: Epistemological potential and boundaries of tractional motion. In: Lolli, G., Panza, M., Venturi, G. (eds.), *From logic to practice, Boston studies in the philosophy and history of science*, vol. 308, pp. 3–21. Springer (2015).
9. Tall, D. O.: Students difficulties in calculus. *Proceedings of Working Group 3 on Students' Difficulties in Calculus. ICME-7, Québec, Canada*, pp. 13–28 (1993).
10. Tournès, D.: *La construction tractionnelle des équations différentielles*. Blanchard (2009).



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