

**NEW PEDAGOGICAL ARCHITECTURES:
innovative concepts and practices in initial teacher training**

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In a world marked by complex and dynamic changes, social and ethical demands have become imbued with uncertainties and rising tensions concerning the future. Within the field of Education, several challenges and issues have emerged - ranging from the inadequate and purposeless use of digital technologies to educational models that appear solely focused on transmitting academic knowledge devoid of context - which seem to ignore society's pressing demands for quality education for all, which should promote citizenship, equity, and social inclusion (Imbernón, 2011).

In pursuit of meaningful educational innovations, the New Pedagogical Architectures (NPAs) introduce an educational reconfiguration for the current school model, addressing both local and global needs that foster profound and purposeful transformations that encompasses the spaces, contents, methods, and relationships within schools (Araújo, 2010). Regarding the perspective of **contents**, NPAs take into account the rapid mutability and evolution of knowledge coupled with the growing and agile demands of society, which requires ongoing individual, autonomous, and collaborative learning (Morin, 2000) founded on ethics and social responsibility (Araújo, 2010). In terms of change to **methods**, NPAs seek to overcome the educational model where students passively receive contents (Freire, 1968/1987) by adhering to constructivist principles that offer individuals an active role in constructing knowledge that's aligned with society's current needs, which is achieved through the use of digital tools and technologies (Bacich et al., 2015). With regard to **interpersonal relationships**, NPAs aim to (re)humanize the educational process (Freire, 1996), while seeking to develop shared autonomy, dialogue, and effective participation through mutual and cooperative learning. They also focus on creating learning communities by expanding the educational relationships among

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students and between teachers and students, recognizing the high value that everyone plays in the development of cognitive, affective, and social skills (Mello et al., 2012).

Several studies have been centered on teacher education as a response to a much needed educational transformation in an ever-changing world (Darling-Hammond & Bransford, 2019, Imbernón, 2011, Alarcão, 2011, among others). It is in this context that the NPAs emerge, addressing the important role of teachers among the challenges brought by continuous change, leading them to increasing tensions, uncertainties, and intensity in the teaching profession (Barreto, 2020). This highlights the need for placing special emphasis on initial teacher education programs, which are in clear need of significant changes in their current model (Azevedo et al., 2012, Gatti, 2010, Pimenta et al., 2017). These programs must not only equip educators with the foundational knowledge essential to the teaching profession (Shulman & Wilson, 2004) but also develop a pedagogical practice that's different from the ones they experienced during their time as students (Imbernón, 2011).

From this perspective, initial teacher education demands an integration of theory and practice (Schön, 2000), in order to overcome the fragmented knowledge model that has characterized teacher identity formation, seeking to integrate scientific, social, cultural, and personal knowledge and expertise (Tardif, 2002) which emphasizes collective education and addresses the imperatives of democratic societies (Imbernón, 2011). When considering the changes needed by the NPAs, teacher education becomes linked to personal development and to how this individual can seek creative, ethical, and socially responsible actions in a specific educational context (Darling-Hammond & Bransford, 2019) promoting the much needed changes to contents, methods, and relationships within schools. As such, initial teacher education must foster the development of essential knowledge, skills, attitudes, and values for teacher autonomy and awareness regarding their role in reshaping educational and social spaces (Nóvoa & Alvim, 2021).

Considering these thoughts, the present study introduces and examines the educational journey and experiences from the elective course “New Pedagogical Architectures”, part of the initial teacher education program at the School of Education of the University of São Paulo (FEUSP), Brazil, conducted during the first semester of 2022.

This course is designed to articulate educational concepts and practices through theoretical-conceptual discussions and hands-on experiences, based on active methodologies and emerging educational strategies, while emphasizing the potential of digital technologies and evaluative processes which promote holistic development and competencies that are essential for teachers in the 21st century. This is achieved by following the principles of Design

Thinking (IDEO, 2009) and leveraging digital technologies, seeking to foster meaningful and innovative learning experiences within initial teacher education.

In this course, Design Thinking served as a learning and teaching methodology, providing an innovative approach to problem-solving that focuses on the unique needs of their intended audience. This methodology typically encompasses five stages - empathize, define, ideate, prototype, and test - and each of these stages employs a set of strategies to create a product and solution that addresses the identified challenges. This process emphasizes key aspects such as creativity, innovation, collaboration, empathy, and systemic problem-solving.

The course was planned as an evening class with 55 enrolled students, with the majority of them coming from the Bachelor's program in Pedagogy. An initial survey was conducted and it was observed that most students were finishing their undergraduate studies, with many gathering some professional experience through paid and curricular internships, while some had already worked as teachers in elementary educational settings. Notably, over 90% of these students were engaged in some professional activity while also pursuing their bachelor's degree. This pre-course survey also identified the students' expectations and prior knowledge and experiences regarding course contents.

The participants' expectations for the course were rooted in their personal and professional needs that resonated with their daily experiences and roles. Some of the most prominent ideas encompass the significance of rethinking their teaching practices, in order to become more meaningful for themselves and their students, the importance of broadening their repertoire of pedagogical approaches, by pursuing holistic development grounded in scientific foundations, and the need to gain better understanding of the innovative and transformative trends that permeate the field of Education.

When asked about their previous knowledge and experiences related to the NPAs, a significant portion of the class indicated that they had little to no exposure to this theme, particularly during their initial teacher education. Some responses revolved around a handful of emerging educational strategies, such as blended learning, flipped classrooms, and STEAM education, which encompasses the integration of Science, Technology, Engineering, Arts, and Mathematics. The excerpts below highlight some of the expectations and previous experiences expressed in the class survey:

I'm hoping to grasp how to incorporate the new technologies and diverse languages into the classroom, [...] and how we can think about education in order to promote holistic development of our students in the current landscape. (S.H.L., 18 to 25 years old)

I believe that [this course] can bring a much wider range of possibilities when we think about education and our pedagogical practice. I think that it will take us to think beyond the traditional schooling format [...] (M.M.B., 36 to 40 years old)

Because I believe that knowing about the New Pedagogical Architectures should be vital to understand and comprehend the tendencies that are directing the future pedagogical structures. (A.O.K., 26 to 30 years old)

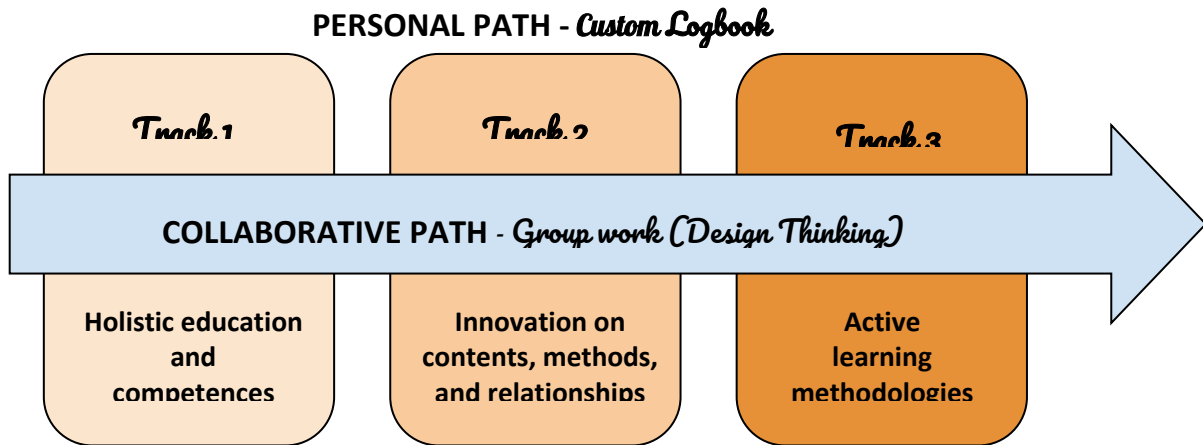
Based on this initial survey, the course outlined contents and activities, organizing them into two simultaneous pathways: the Personalized Path - where each student made their own digital logbook, with freedom to create, express, and document their reflections on their learning process and allowing each of them to progress at their own pace and according to their learning style - and the Collaborative Path - where students worked collectively, guided by the Design Thinking methodology to conceive and develop an educational project rooted in active learning methodologies and emerging educational strategies, addressing the challenges prevalent in the educational contexts that each group had chosen to visit.

Both Personalized and Collaborative Paths were carried out simultaneously through three distinct knowledge tracks: “1. Holistic development and the notion of competencies”; “2. Educational innovations in contents, methods, and relationships”; and “3. Active learning methodologies”.

The knowledge tracks were designed as didactic sequences, aligning the courses’s contents and the students’ previous experiences and knowledge, bringing up conceptual and procedural contents to foster a purposeful teaching and learning process, encouraging students to be protagonists through the use of active methodologies and emerging educational strategies, while promoting practical experiences linked to the NPAs’ principles. Each knowledge track also posed a guiding question to steer reflective thinking, fostering the development of knowledge networks by the students.

Track 1, based on the guiding question “why new pedagogical architectures?”, delved on reflections encompassing historical educational revolutions, the paradigms and tensions surrounding knowledge, and the concept of holistic development and cultivation of competencies and skills. Track 2, guided by the question “what are the new pedagogical architectures and what are their educational implications?”, introduced the constructivist epistemology and relational pedagogy as part of the educational reinvention process, detailing the possibilities for transformative change across contents, approaches, and relationships. Track 3’s main question was “which strategies can integrate the new pedagogical architectures?” and delved into the active learning methodologies and emerging educational strategies,

incorporating key aspects such as information technology, evaluative processes, and holistic and ethical development.



Over the semester, within the Personalized Path, each student crafted their personal custom Logbook by using digital resources to document and connect their insights and perceptions regarding the concepts and experiences from each class. These records encompassed several text, visual, and audio elements, such photos, artworks, and audio and video recordings.

Students were encouraged to reflect upon their educational journey - forging connections between the course's thematics and their personal values, interests, and projects as both individuals and future educators - regarding the context of each of the three knowledge tracks and their associated guiding questions, in order to appreciate the presence (or absence) of the NPAs within their own primary and higher education experience, the importance of reinventing the field of Education, and explore possibilities, limitations, and impacts inherent in this process. Prior to these reflections, each student was invited to record in their Logbook an opening guiding question, "who am I?", regarding their own perceptions about themselves and their journey.

Within the Collaborative Path, each student group developed an innovative project that could address the needs identified in their chosen educational setting, adhering to the process outlined by the Design Thinking method, and incorporating at least one of the following active learning methodologies and emerging educational strategies: flipped classroom, gamification, virtual and/or augmented reality, robotics and/or maker movement, problem and project-based learning (PPBL), peer instruction, inquiry-based learning, station rotation, STEAM (Science, Technology, Engineering, Arts, and Mathematics), and/or storytelling.

Each group addressed the initial guiding challenge by selecting and visiting an educational setting - such as schools, NGOs, and museums - in order to understand their reality, challenges, and needs. Each project was rooted on both theoretical and practical perspectives from the course, while being applicable and well-suited to the selected educational setting's unique traits. The goal was to promote an education process considering individuals in their complexity, encompassing their cognitive, affective, and social aspects.

In addition to the project development, each group had to craft a micro-experience derived from their original project and that could be applied with their peers within a time constraint of 40 minutes. Each group was also required to document their experience, adhering to the conventions of scientific paper formatting, with the purpose of describing their project and its implementation. The group's journey was also documented by their members using the Jamboard tool, while sharing their perceptions and experiences from their visits to the selected educational settings.

Throughout the semester, course classes provided a series of practical experiences that were connected to NPAs' principles. The main experiences encompassed a workshop inspired by the maker movement - where students crafted artistic prototypes from recyclable materials, based on the Sustainable Development Goals (SDG), so students experienced self-knowledge and used their skills and competences -; a reflective station rotation approach - encompassing reading materials, videos, discussions, and case studies based on NPAs' principles -. the Gamification of certain course contents - deploying digital tools such as Mentimeter, Wordwall, and Kahoot -; a STEAM-based activity driven by station rotation - using the Skyview Lite app to explore celestial bodies through augmented reality, building a Science prototype using recycled materials, and mobilizing mathematical thinking by introducing dice games and the ABPP -; and, lastly, through a remote workshop inspired by digital technologies - where students programmed through the Scratch tool an educational game about school life, relationships, and emotional learning.

Within the Collaborative Path, one of the most relevant classes revolved around the Fishbowl activity, based on the stages of the Design Thinking process, where student groups presented their project propositions and prototypes. The session encouraged reflection, debate, and cooperation, while some guests and specialists - composed of experienced teachers and educators - were invited to evaluate the students' prototypes and provide suggestions to the members of each group.

As the course drew to a close, student groups conducted the micro-experiences derived from their projects, within 40 minutes, where they applied the active learning methodologies

and emergent educational strategies from their proposition. Overall, the groups favored interventions that were inspired by NPAs' principles, mixing the needs and limitations from the educational settings visited by its members, while balancing between the resource and technological restraints, the life and educational journey of each member, and the active pursuit of innovative solutions.

The highlights from the micro-experiences include a tour of the FEUSP building, seeking out spots marked by garbage and littering, a hands-on workshop with graffiti and production of natural paints, a workshop centered on collage-making, interactive sessions with videos and audios, as well as activities based on board-games and role-playing. These innovative propositions, while inspired by the NPAs, set themselves apart from other course experiences, being aligned more closely to the everyday realities of public schools in São Paulo, which were the preferred educational settings chosen by most groups.

Following the micro-experiences, students finished their project documentation by using the Jamboard tool. They organized and recorded their experiences in the form of a scientific paper, describing the unique traits of their project as well as its implementation within the selected educational setting, while referring to the theoretical and procedural data aligned with the NPAs' principles.

In the Personalized Path, the custom Logbook offered autonomy and freedom so each student could choose the language, tool, and style they preferred to best document their experience and journey through the course. Most students chose slide presentation tools, such as PowerPoint and Google Slides, while mixing elements such as text, photos, illustrations, and artwork. Some participants preferred writing their logbook in a continuous text format, while other students chose to record podcasts and video recordings containing their own narratives. It's noteworthy to highlight that most students managed to articulate the theoretical and procedural foundations from the course with their own personal and professional experience in the educational field, encompassing their interests, expectations, goals, and plans for the future.

At the end of the course, 43 students took a self-assessment survey, expressing their perceptions about the ways it contributed to their initial teacher education as future educators, while including their own perceptions regarding the competences they developed, the learning process they perceived as being more purposeful, how welcoming and collaborative the group work was, the impact of the educational strategies experienced during the semester, the applicability of these strategies in their professional work as teachers, as well as the feelings involved in their journey through the course. Finally, students were also asked to make

suggestions for the betterment of future courses, aiming at a more purposeful initial teacher educational process.

Overall, students praised the experience with active learning methodologies and emerging educational strategies, highlighting the change in the teacher-student relationship based on NPAs' principles and the innovative propositions which were both adequate and feasible for the adversities found in the educational settings in the Brazilian context.

Table 1: Strategies and methodologies considered by students as having “high impact” or “very high impact” to their initial education

Active methodologies and emerging strategies	Percentage
Teacher-led presentation and exposition	98%
Small group activity with active methodologies	95%
Large group / class discussion	93%
Planning and implementation of micro-experiences	93%
Use of apps such as Mentimeter, Jamboard, etc.	84%
Pre-reading course texts	81%
Group work using Design Thinking	77%
Pre-watching course videos	74%

According to the students' perceptions, the journey undertaken during the semester allowed them to develop key skills and competences as educators, going beyond aspects solely related to classroom teaching, which happened often in other courses during their undergraduate program. Participants highlighted the importance of considering students and teachers as complex and integral individuals and human beings who go through continuous development of competencies required by today's societies.

Table 2: Competencies that were “significantly” and “very significantly” developed, according to students perceptions, after completing the course

Developed competencies	Percentage
Empathy and collaboration	95%
Curiosity and creativity	95%
Critical and reflective thinking	91%

Communication and argumentation	88%
Self-knowledge	84%
Social responsibilities	79%

When asked about suggestions for course improvement, students perceived that having more time to dedicate themselves to experience the course propositions was considered as being very important. They also noted that this is difficult for many students nearing the end of their undergraduate program. This was an atypical trait particular to this set of students, but it also demonstrated that undergraduate students, from initial teacher education programs, are often subjected to extenuating work overload (Azevedo et al., 2012, Gatti, 2010, Pimenta et al., 2017). Another noteworthy aspect was the perception that attending classes and having quality group interactions was a key factor for some students in their learning process along the semester. As such, it could be highlighted how much constituting a learning community, where all members learn and teach together, should be prioritized in undergraduate programs (Mello et al., 2012).

Another aspect that could be mentioned is that despite the students' general desire to learn more about and experience the NPAs, it became noticeable that a few students, during the semester, maintained some level of distrust and resistance toward the NPAs' principles - including the holistic development of human beings, considering their values and feelings, and the innovations and emergent educational strategies - keeping a critical stance based on conceptual and procedural perspectives that diverged from the course. This was partially expected, considering the broad range of theoretical perspectives and approaches currently existing in the field of Education. Below, some concluding reflections from the students were highlighted from the self-assessment survey:

I complete this course with much more creativity and critical thinking in order to teach classes that avoid the traditional [model], classes that will impact my students and turn them into active protagonists of their teaching-learning process. (N.M.C., 18 to 25 years old)

The immersion on [active] methodologies also allowed us to break through the prejudice surrounding these new strategies and brought us a sense of not stagnating with traditional practices. (R.E.S.L., age not specified).

[...] this pedagogical approach impacted me because it shows other educational possibilities, where we can develop other types of relationships, not just with the student but also with the school environment and curriculum (B.A.A., age not specified)

[...] I understand the active methodologies not just in theory, but also experienced them during classes and micro-experiences developed by my peers, so I could get inspired and have an idea of how I could bring these methodologies to my future [teaching] practice [...] (A.L.T.M.W., 18 to 25 years old)

[...] having the theoretical foundation to be able to think and understand the innovative process from a different perspective than the simple mechanism of [...] praising innovations for the sake of being new, seeing that this movement is [scientifically and] critically based brings immense relief. (A.V.P.B., age not specified)

After nearly finishing the entire [bachelor] course in Pedagogy, I feel that this course brought valuable content for my holistic education as an educator. (M.L.C.L., 18 to 25 years old)

The findings highlight the relevance of experiences that articulate theory and practice in initial teacher education (Schön, 2000) and are aligned with the imperative for an holistic education based on moral values. When evaluating the outcomes from this course, considering its advances and limitations, it becomes evident that promoting an initial teacher education experience with the capacity to face and transform the current reality of Brazilian schools is indeed possible (Nóvoa & Alvim, 2021).

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