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Designing with Artificial Intelligence: Gantt Chart Tools, Educational Leadership, and Process Management

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Abstract: This paper examines how generative artificial intelligence and Gantt chart applications can support educational planning, leadership, and project management. An exploratory-comparative study uses a simulated educational scenario and standardized prompts to assess initial planning, task dependencies, responsibilities, and adaptation to unforeseen events. Outputs are compared in terms of accuracy, usability, accessibility, temporal coherence, and pedagogical relevance, including collaboration, transparency, and agency. Expected findings suggest that general-purpose AI facilitates rapid drafting and revision, while dedicated tools offer more reliable scheduling and accountability. Both require human review to detect omissions, unrealistic assumptions, and contextual mismatches. The study argues that educational value emerges not from automated charts alone but from discussion, validation, and revision, fostering AI literacy, authentic learning, and responsible decision-making.

Keywords: artificial intelligence; agency; educational planning; Gantt charts

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1. Introduction and Theoretical Framework[1]

The growing availability of generative artificial intelligence tools opens up new possibilities for supporting educational design, particularly in the preliminary organization of information, the definition of activities, and the formulation of operational alternatives. These opportunities arise within educational processes characterized by increasing complexity, in which it becomes necessary to coordinate

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learning objectives, resources, professional expertise, and organizational constraints, while maintaining a comprehensive view of the actions to be carried out. The literature highlights both the potential and the challenges of using artificial intelligence in teaching. In particular, Celik et al. (2022) emphasize how these systems can support different stages of the educational process, from planning to assessment, while also stressing the importance of the skills needed to critically interpret the information produced and use it in alignment with educational goals. Similarly, the competency framework proposed by UNESCO (2024) emphasizes the need for informed, responsible, and person-centered use, in which technological support does not replace professional judgment but helps to expand the possibilities for analysis and intervention. From this perspective, the assisted creation of a timeline serves as a concrete example through which to examine the relationship between automated processing capabilities, decision-making responsibility, and contextual conditions.

1.1 Artificial Intelligence and Gantt Charts in Educational Design

Among the tools that make it possible to visualize the timeline of a project, the Gantt chart has established itself as a standard, as it allows for the graphical representation of planned activities, their distribution over time, operational sequences, and the progress of the work. Its introduction took place within the context of the scientific organization of work, when the need to coordinate increasingly complex production processes made it necessary to have tools capable of visualizing timelines, resources, and deviations from the initial schedule (Gantt, 1919). From its very origins, therefore, the diagram has served a dual purpose: to organize work and to make its progression understandable, providing a representation that can be shared among all stakeholders. To understand its potential and limitations, Geraldi and Lechter (2012) trace its historical and conceptual evolution, highlighting how the Gantt chart—despite having gradually become a central tool in project management and finding application in organizational contexts different from its original ones—retains certain assumptions characteristic of Scientific Management. The authors identify six principles that characterize its logic: time-focused, objectivity, determinism, analytical, accountability, and sequentiality. These dimensions point to the possibility of breaking down a complex project into recognizable activities, defining their duration, establishing an order of execution, and identifying the responsibilities associated with the various operations. One of the most significant aspects concerns the diagram's ability to make legible what Geraldi and Lechter (2012) define as structural complexity, bringing together different and interdependent activities into a unified representation and facilitating an understanding of the temporal relationships that connect them. The Gantt chart thus provides a common framework through which to discuss work organization, identify potential overlaps, recognize possible delays, and deliberate on project priorities. Its usefulness, therefore, extends beyond simply setting deadlines; it also lies in the ability to make certain elements of the process explicit—elements that, if left solely to a narrative description, might be less immediately interpretable. These considerations take on particular significance in educational planning, where the implementation of an intervention often involves different professional roles, limited resources, participants with diverse needs, and actions that must be coordinated over time. The Gantt chart can help make this structure comprehensible , offering those involved a shared representation of activities, interdependencies, and responsibilities. From this

perspective, it can be interpreted not only as a technical planning tool but also as a mechanism for project mediation, through which the representation of the process becomes an opportunity for discussion, coordination, and the sharing of decisions. It must be noted, however, that graphically representing a project does not necessarily mean understanding and managing all its dimensions. It is precisely this aspect that is the focus of the critical reflection by Geraldi and Lechter (2012), who highlight how the logic of the Gantt chart frequently presupposes the possibility of defining activities, durations, and sequences in advance according to a relatively stable and predictable representation. This approach, consistent with a rational and deterministic conception of organization, can be effective in highly structured situations, but it encounters certain limitations when processes are marked by uncertainty, changes, and interactions that are difficult to predict. The critical issue lies not so much in the tool itself as in the meaning attributed to its representation. A clear and detailed schedule could, in fact, be perceived as an objective and definitive description of the process, whereas it is actually the result of choices, interpretations, and assessments made at a specific point in time. The durations assigned to activities, the identified sequences, and the anticipated dependencies do not necessarily represent stable conditions, but rather planning assumptions that may require subsequent revisions. As Geraldi and Lechter (2012) observe, an unreflective use of the diagram also risks focusing attention primarily on meeting deadlines, pushing other aspects that contribute to a project's quality and success into the background—including relationships, organizational learning, and the ability to respond to emerging situations. This observation is particularly relevant in the educational context, where planning cannot be reduced solely to the execution of scheduled activities. Educational processes unfold through interactions among people, contexts, and conditions that may change during the implementation of interventions, requiring continuous adjustments and a constant interpretation of situations. Planning remains necessary, but it must allow for flexibility that enables the reconsideration of initial decisions in light of emerging needs and participants' responses. In this sense, the perspective proposed by Geraldi and Lechter (2012) calls for moving beyond a prescriptive use of the Gantt chart, shifting toward a contextualized and reflective approach in which the timeline is viewed as a modifiable representation rather than a rigid framework to be followed regardless of the project's evolution. From this interpretation emerges a possible pedagogical application of the tool: the creation of a Gantt chart can become an integral part of the planning process when the stakeholders involved are called upon not only to place activities along a timeline but also to discuss priorities, clarify constraints, recognize interdependencies, and justify the choices made. Discussions about the schedule can thus help make decisions more transparent and foster forms of shared responsibility, without reducing educational coordination to a mere distribution of tasks and deadlines. This framework also includes reflection on the use of generative artificial intelligence and specialized software in the creation of Gantt charts. The ability to quickly obtain an initial representation of the project, organize complex information, and modify operational sequences can provide significant support for those engaged in educational planning. At the same time, the speed of processing and the graphical quality of the outputs do not guarantee that the identified activities are actually consistent with the objectives, that the durations are realistic, or that the dependencies correspond to the organizational conditions of the context. The analysis by Geraldi and Lechter (2012), while not directly concerning generative artificial intelligence, thus offers a useful interpretive framework for examining these tools as

well. While the Gantt chart incorporates specific assumptions about the predictability and organization of processes, its automated generation neither eliminates these assumptions nor resolves the critical issues that may arise from them. On the contrary, it makes it even more important for the designer to scrutinize the resulting representation, verify its consistency, and make the necessary modifications. From this perspective, the value of the Gantt chart in educational design lies not exclusively in its ability to sequence activities over time, but above all in its capacity to make the choices guiding the intervention visible and open to discussion. The timeline becomes a mediating tool when it facilitates dialogue among the stakeholders, helps identify responsibilities, and keeps open the possibility of revising the plan in light of conditions that emerge during its implementation. Artificial intelligence can contribute to this process by facilitating the construction and revision of project representations, provided that its use remains subject to critical evaluation and professional responsibility. The central issue, therefore, concerns not only the tool's ability to produce a formally correct diagram, but the conditions under which such a representation can support informed, shared decisions that are consistent with educational goals.

1.2 Agency and AI-Supported Educational Design

Alongside technical and organizational indicators, the analysis considers certain pedagogical dimensions that allow for a deeper exploration of the relationship between digital tools, educational design, and professional responsibility. Among these, the construct of agency takes on particular significance, understood as the individual's ability to act intentionally, guide their own choices, and influence the conditions that characterize the context in which they operate. From a sociocognitive perspective, Bandura (2001) identifies intentionality, anticipation of consequences, self-regulation, and self-reflection as fundamental dimensions of agency. The individual is therefore not viewed as a mere recipient of environmental influences, but as a subject capable of actively contributing to the construction of their own experiences and the conditions under which they occur.

This interpretation has been significantly developed in the context of teaching professionalism. Biesta et al. (2015) emphasize that agency cannot be reduced exclusively to an individual characteristic but must be understood in relation to the cultural, structural, and material conditions within which educational action unfolds. The ability to exercise professional judgment depends, in fact, also on the scope for decision-making afforded by the context, the available resources, and the ways in which educational processes are organized.

The work of Aiello et al. (2016) also aligns with this approach; by drawing on the theory of simplicity, they highlight the active role of the teacher in identifying strategies capable of responding to the variability of educational situations. Professional practice requires the ability to recognize the possibilities offered by the context, select alternatives, and adapt one's methods of intervention, avoiding a rigidly prescriptive application of procedures. This perspective is further developed in Aiello et al. (2023), who explore the potential of the simplicity approach in teacher education and in promoting inclusive practices.

The relationship between agency and planning takes on particular significance when professional decisions are supported by artificial intelligence systems. The systematic review by Celik et al. (2022) highlights the opportunities offered by AI for the planning, implementation, and evaluation of educational activities, while also emphasizing the skills needed to interpret and critically use the information produced

by these systems. From this perspective, technological support does not automatically equate to an expansion of professional autonomy, as the latter depends on the ability to understand, evaluate, and manage the proposed solutions.

Another key aspect concerns the transparency of decision-making processes. Khosravi et al. (2022), in their in-depth exploration of explainable artificial intelligence in educational contexts, emphasize the importance of making the information and logic through which systems produce their results understandable. The ability to critically interpret outputs is, in fact, a key prerequisite for maintaining control over decisions and preventing technological complexity from leading to forms of delegation that are not sufficiently informed.

In light of these contributions, agency plays a significant interpretive role in the comparison between ChatGPT, Gemini, and GanttTool. The automated generation of a Gantt chart can facilitate the organization of information and the temporal representation of activities, but it does not, in and of itself, guarantee greater decision-making capacity on the part of the planner. It is necessary to consider whether the tools allow users to recognize the choices underlying the planning, intervene in the operational sequences, modify durations and dependencies, and reorganize the schedule in relation to contextual needs.

From this perspective, the analysis of agency is limited to the observable characteristics of the tools and the outputs they produce, with particular reference to the modifiability of the schedule, the possibility of revising activities, the transparency of organizational information, and the need for human supervision. While these indicators do not allow for a direct measurement of professionals' agency, they do enable the identification of certain technological and organizational conditions that may either support or limit the exercise of that agency.

The reference to agency thus allows for a broader interpretation of the comparison's results, avoiding the mistake of equating planning effectiveness solely with the speed of generation or the graphical completeness of the diagram. The pedagogical value of the tools also lies in their ability to maintain a space for interpretation, choice, and reworking, in which the professional retains responsibility for decisions and uses technology as a resource to address the complexity of educational design.

1.3 Objectives and Research Questions

The research questions are: (RQ1) What differences emerge in the completeness, temporal consistency, readability, and representation of dependencies, milestones, and responsibilities in the diagrams produced by the three tools? (RQ2) What strengths and weaknesses, as documented by the outputs, are relevant to the planning, coordination, and monitoring functions of educational leadership? (RQ3) What needs for human verification and supervision emerge from the inconsistencies, omissions, and unstated assumptions?

The objective of this study is to compare two general-purpose generative artificial intelligence systems and one specialized tool for creating Gantt charts, examining their potential, limitations, and pedagogical and organizational implications in the planning of a complex educational project.

2. Materials and Methods

2.1 Study Design

The research adopts an exploratory-comparative design. The same case study is processed by the three selected tools using a common task, with the aim of making the resulting outputs comparable. The comparison addresses both the structure of the diagrams and the procedural aspects observed during the use of the tools.

2.2 Case Study: PNRR Project for the Prevention of Early School Leaving

A PNRR project aimed at preventing and combating early school leaving was selected as the case study for this experiment. The project was implemented in a school comprising nine campuses characterized by different socioeconomic and territorial conditions. The choice of this project responds to the need to use a case that is sufficiently complex and representative of the educational and organizational planning processes that school leadership is called upon to manage. The presence of a variety of actions, target groups, professional roles involved, and different timeframes allows for a concrete assessment of the ability of AI-based tools to support the structuring of a timeline. The planning of the intervention begins with an analysis of the school's Self-Assessment Report, the " " (National Learning Profiles), standardized test results, and a longitudinal comparison of learning outcomes, all of which highlight the need to develop specific interventions to address situations of vulnerability and reduce the risk of both implicit and explicit school dropout. Although the school's overall results are close to the regional average, they highlight the need to strengthen certain skills and to bridge the gaps that have emerged or widened during the pandemic. The planned actions involve the entire school community but focus particularly on students identified by the class councils as being most at risk of academic failure or dropping out. The project includes interventions to remediate and strengthen basic skills, with particular emphasis on Italian and mathematics, supplemented by mentoring and guidance activities, motivational programs, educational and co-curricular workshops, and initiatives aimed at involving families. The project documentation highlights, in particular, the technical work of the Team for the Prevention of Early School Leaving, mentoring and guidance programs, programs to strengthen basic skills, motivation, and support, guidance programs involving families, and co-curricular training and workshop programs.

Skill-recovery programs are designed in collaboration with subject teachers and employ active and participatory methodologies, in which subject-specific learning is integrated with hands-on, creative, and motivating activities. From this perspective, theater, sports, gaming, and other educational experiences serve a complementary role to strictly subject-based instruction, helping to strengthen motivation, participation, cross-curricular skills, and a sense of belonging to the school community. A central role is assigned to mentoring, coaching, and guidance activities. Support for the most vulnerable students is provided through ongoing guidance aimed at fostering motivation to study, self-efficacy, awareness of one's own resources, and the ability to set progressive goals. For middle school students, guidance regarding their subsequent educational path is also particularly important, as it serves as a preventive measure against the risk of dropping out in high school. The project also involves families through structured dialogue and support programs, aimed at strengthening the

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educational partnership between the school and the family environment. The project team guides the entire process through coordination, monitoring, and evaluation activities, including periodic reviews of progress and opportunities for student self-assessment. The timeline thus becomes not merely a tool for representing the passage of time, but a mechanism for managing a complex educational process in which different activities, various stakeholders, deadlines, overlaps, and decision-making moments must be coordinated.

Clarification on the time frame of the case study. The original project, documented on the FUTURA platform, has an actual implementation period ranging from June 7, 2023, to March 31, 2025. For the purposes of comparative analysis, this experience serves as the reference for the structure of activities and organizational constraints, while the generated diagrams may outline scenarios for new planning, including those pertaining to 2026–2027. These representations should therefore not be interpreted as reconstructions of the project's historical dates. Their temporal consistency must be evaluated by distinguishing the internal plausibility of the sequences from any adherence to a chronological horizon explicitly assigned in the experimental assignment.

2.3 Tools and Standardized Procedure

The project description was used as a common reference for analyzing the outputs generated by ChatGPT, Gemini, and GanttTool. The selection includes two general-purpose generative AI systems and a specialized application for creating Gantt charts. The comparison focuses on the characteristics observed in the three available schedules and does not constitute a controlled test of the platforms' overall performance. The observed differences may stem from the tools' functionalities as well as from the conditions of interaction and the choices made regarding representation. The analysis focuses on the outputs' ability to represent the project phases, activities, time distribution, overlaps, dependencies, milestones, and responsibilities. The available documentation allows for a comparison of the initial artifacts (T0), but does not enable verification of the complete identity of the technical conditions of the sessions, the service versions, and the full prompts actually used. For this reason, the results are interpreted as descriptive evidence pertaining to the diagrams examined. The project task used as a reference consists of translating the description of a PNRR initiative for preventing and combating early school leaving into a structured timeline. The summary of the assignment, which serves to define the scope of the comparison, is provided below; it should not be understood as a certified transcript of the entire history of interactions with the three systems.

Reference Assignment for the Analysis of T0 Outputs

"Based on the project description of a PNRR initiative aimed at preventing and combating early school leaving, develop a Gantt chart that illustrates the main activities and their timeline."

Time frame of the analysis. The PNRR project used as a reference took place between June 7, 2023, and March 31, 2025; the diagrams examined, however, represent project plans that may refer to different time horizons. The dates in the outputs are therefore considered planning assumptions and not confirmations of the actual dates of project execution. Since no binding time frame common to the original prompts is documented, the discrepancy between the years represented is not, in and of itself, considered an error of the tool. Scope of the evidence. The comparison presented concerns exclusively the available initial artifacts (T0). No definite dates are assigned to the original sessions in the absence of the relevant records, nor are revision attempts

presented as having been carried out in the event of unforeseen circumstances. Temporal consistency is assessed with respect to the internal sequence of activities and organizational plausibility, distinguishing it from adherence to any undocumented chronological constraints.

2.4 Phases of the Experiment

Phase T0 – Analysis of Initial Schedules

Phase T0 includes the three initial schedules assigned to ChatGPT, Gemini, and GanttTool and reported in the results section. The artifacts were compared as provided, without making any corrective changes to the diagrams used as the subject of analysis. The examination considered the completeness of the activities, the structure of the phases, the chronological sequence, the explicit presence of dependencies, milestones, and responsibilities, as well as the readability of the representation. The assessments are summarized in the comparative matrix and the SWOT analysis, which are exploratory in nature and specific to the case analyzed.

Phase T1 – Revision in the Face of Unforeseen Events: Scope of the Study

The revision of the schedule following an organizational contingency constitutes a methodologically relevant dimension for evaluating the adaptability of the tools. However, the available material does not include a uniform and documented T1 test for all three systems. Consequently, this paper does not assign comparative scores to the management of contingencies and does not draw experimental conclusions regarding the ability to recalculate or revise dependencies. Modifiability is discussed only within the limits of the observable characteristics of the outputs and the described usage patterns. A controlled assessment of adaptability would require subjecting each tool to the same unforeseen event, recording prompts and outputs, and comparing the revisions according to uniform criteria. Such an in-depth analysis is listed among possible future research directions and is not included in the results presented here.

The distinction between T0—documented through the available artifacts—and T1—which was not examined—avoids equating the quality of the initial planning with the ability—unverified in this analysis—to adapt it to changed organizational conditions.

2.5 Analysis Criteria

The technical-organizational analysis is complemented by an interpretive pedagogical framework: agency is considered within the limits of the modifiability of the output and the possibility of retaining decision-making control, without directly measuring personal agency (Bandura, 2001; Biesta et al., 2015); the transparency of decisions is assessed through the explicit articulation of information, assumptions, dependencies, and responsibilities (Khosravi et al., 2022); the authenticity of the task refers to the consistency of the artifact with the objectives and constraints of the PNRR case (Herrington et al., 2006); collaboration is considered in terms of its potential for clarity and sharing, not as actually observed interaction; professional oversight involves the critical review of outputs and the need to correct omissions and inconsistencies (Celik et al., 2022). Pedagogical judgments are therefore limited to the evidence actually available.

The diagrams were evaluated using a common rubric that considers the completeness of the schedule, the structure of the phases, temporal consistency, dependencies, milestones, responsibilities, readability, the need for revision, and graphical limitations or technical . The SWOT analysis is used as an interpretive

summary of the observed evidence, distinguishing strengths, weaknesses, opportunities, and threats.

3. Results

3.1 ChatGPT Output

The first output was generated using ChatGPT. Starting from the narrative description of the project, the system organized the information into a sequence of macro-activities, structuring the process into the following phases: launch, needs analysis, student identification, co-design, implementation of educational programs, mentoring, guidance, workshops, family involvement, monitoring, evaluation, and closure.The timeline visualization allows one to see the sequence of initial activities and the subsequent overlap of training, motivational, and support interventions. In particular, activities related to basic skills, mentoring, workshops, guidance, and family involvement are represented as partially simultaneous processes, while monitoring, evaluation, and reporting accompany or conclude the main operational phases.

In addition to the classic Gantt chart, ChatGPT also enabled the creation of a second visualization of the process organized by phases and milestones. This representation highlights the project's key strategic steps and allows for an observation of the relationship between the chronological sequence and decision-making moments.

Figure 1. Gantt chart of the PNRR project generated using ChatGPT.

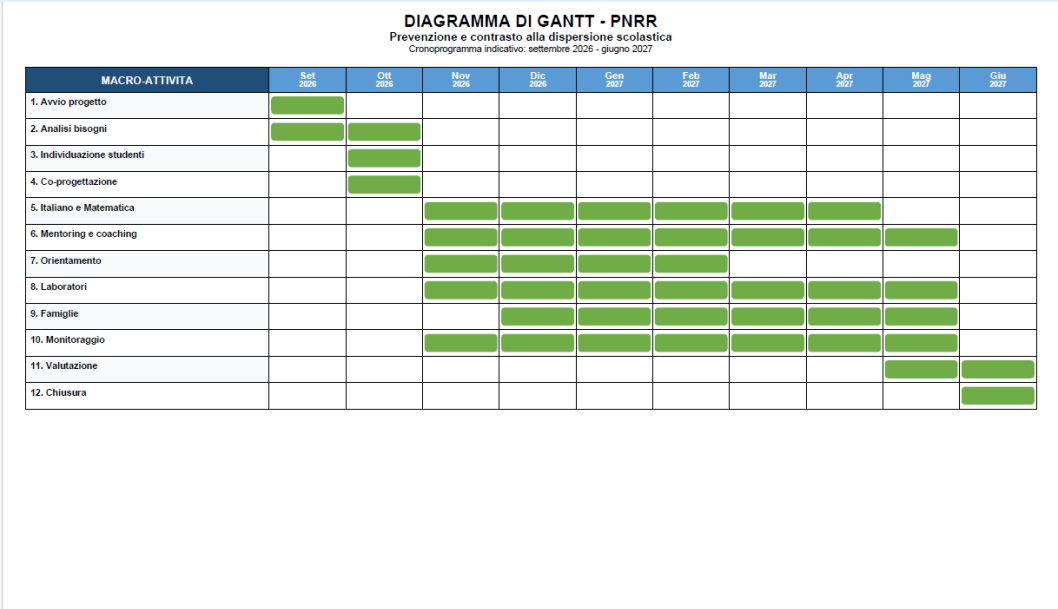


DIAGRAMMA DI GANTT - PNRR
Prevenzione e contrasto alla dispersione scolastica
Cronoprogramma indicativo: settembre 2026 - giugno 2027

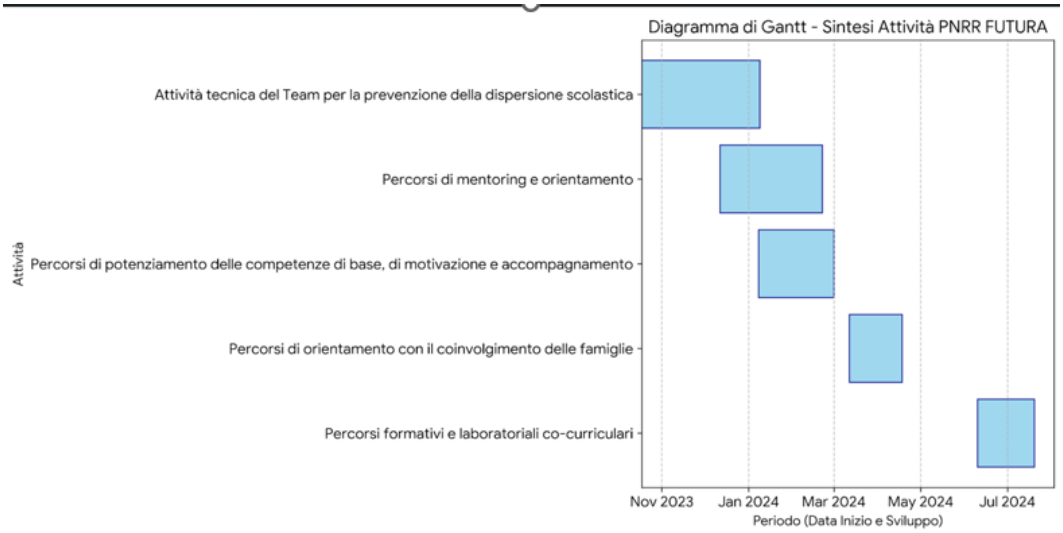
MACRO-ATTIVITÀ	Set 2026	Ott 2026	Nov 2026	Dic 2026	Gen 2027	Feb 2027	Mar 2027	Apr 2027	Mag 2027	Giu 2027
1. Avvio progetto	■									
2. Analisi bisogni	■	■								
3. Individuazione studenti		■								
4. Co-progettazione		■								
5. Italiano e Matematica			■	■	■	■	■	■		
6. Mentoring e coaching			■	■	■	■	■	■	■	
7. Orientamento			■	■	■	■				
8. Laboratori			■	■	■	■	■	■	■	
9. Famiglie				■	■	■	■	■	■	
10. Monitoraggio			■	■	■	■	■	■	■	
11. Valutazione									■	■
12. Chiusura										■

3.2 Gemini Output

The same project description and the same prompt were subsequently used with Gemini. In this case as well, the objective was not simply to verify the system's ability to generate a diagram, but to observe how a different generalist model interprets and

structures the project information. The output generated by Gemini was therefore retained in its original form, without any preliminary corrections, so that the choices regarding the identification of activities, their sequence, duration, overlaps, dependency management, and the overall representation of the schedule could be subsequently analyzed.

Figure 2. Gantt chart of the PNRR project generated using Gemini.

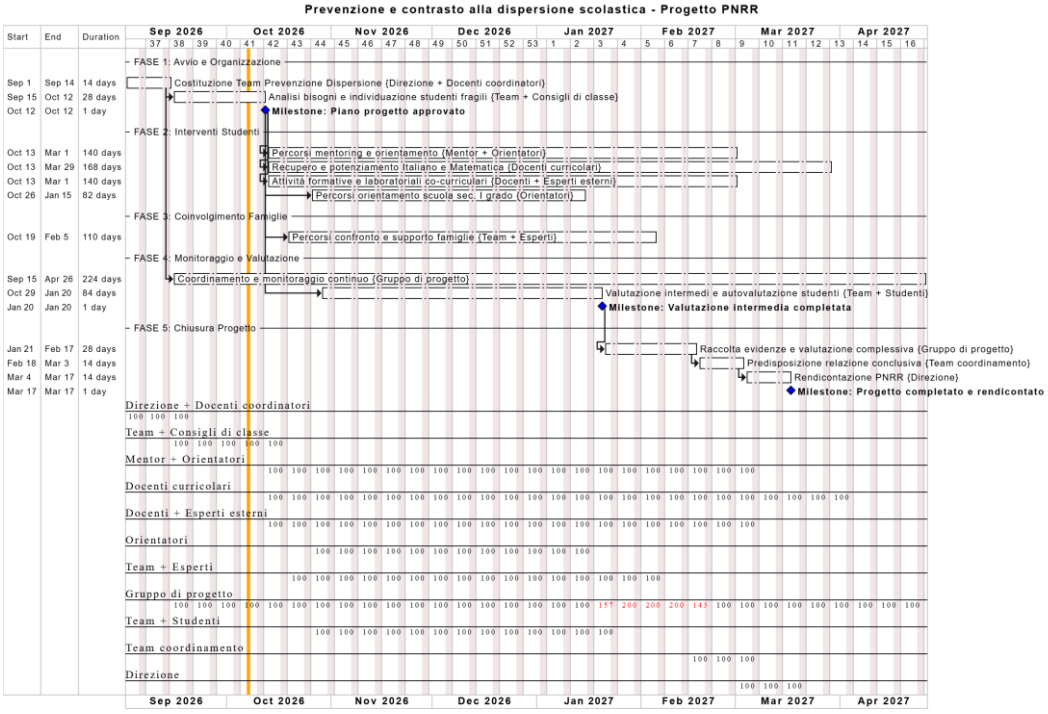


3.3 GanttTool Output

In the third phase, the same case study was analyzed using GanttTool, with both the project content and the delivery date remaining unchanged. The inclusion of a specialized tool allows us to introduce into the comparison a technology specifically designed for the creation and management of Gantt charts and to verify whether this specialization offers advantages over general-purpose generative systems. The output generated by GanttTool was adopted without substantial modifications and considered as the third element of the comparison.

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Figure 3. Gantt chart of the PNRR project generated using GanttTool.



3.4 Results of the Comparison

The three diagrams were analyzed using the SWOT comparative grid developed for the study. The evaluation followed a scale from 0 to 3. For indicators related to strengths and opportunities, 0 indicates absence or inadequacy and 3 indicates full adequacy; for weaknesses and threats, however, 0 indicates no criticality and 3 indicates high criticality. This procedure allows the SWOT analysis to be transformed from a descriptive exercise into an interpretive synthesis based on observable evidence.

Table 1. Comparative evaluation of outputs according to SWOT indicators

SWOT	Indicator	ChatGPT	Gemini	GanttTool	Summary Highlights
S	Completeness of the Schedule	3	2	3	ChatGPT and GanttTool provide a more comprehensive overview of the entire process; Gemini is more concise.
S	Breakdown of the Phases	3	1	3	ChatGPT and GanttTool clearly structure the project; Gemini keeps the number of macro-actions to a minimum.
S	Temporal Consistency	NV	NV	NV	Different time periods; no common time frame documented. Rating not assigned.
S	Addiction Management	0	0	3	Only GanttTool explicitly represents dependency relationships.
S	Milestone	0	0	3	The milestones are shown in the detailed diagram.
S	Responsibilities	0	0	3	GanttTool associates tasks with roles; in general-purpose diagrams, these are not represented graphically.
S	Clarity and Readability	3	3	1	ChatGPT and Gemini are straightforward; GanttTool is more dense and requires closer interpretation.

W	Errors/Temporal Inconsistencies	NV	NV	NV	Cannot be assessed as an error without verifiable common chronological constraints.
W	Missing activities	0	2	0	Gemini omits several management phases; ChatGPT and GanttTool are more comprehensive.
W	Excessive generality	1	2	0	GanttTool is more analytical; Gemini is more general.
W	Missing/incorrect dependencies	3	3	0	Missing from the two general-purpose diagrams; present in GanttTool.
W	Information/assumptions not explicitly stated	1	2	1	All outputs require verification of assumptions; this is particularly critical in Gemini.
W	Need for human review	1	3	2	ChatGPT requires additions; Gemini requires substantial review; GanttTool requires expert review of details.
W	Graphical/technical limitations of the output	0	1	2	GanttTool offers more detail but has a higher graphical density; Gemini has limitations in terms of completeness.

3.5 Comparative Analysis of the Outputs

The output generated by ChatGPT exhibits a high level of completeness and clarity of representation. The system organizes the project into macro-activities and immediately highlights the sequence of phases and the main time overlaps. This feature is particularly useful in educational contexts, where the schedule must also be shared with individuals who are not project management specialists. The main limitation concerns the absence, in the generated diagram, of an explicit representation of dependencies, milestones, and the assignment of responsibilities. ChatGPT thus emerges as an effective tool for summarizing, communicating, and initially structuring the process, but requires professional integration when the Gantt chart must assume a more analytical control function.

Gemini provides a more streamlined and immediately readable representation. The system identifies the project's main macro-actions but reduces organizational complexity and does not explicitly show dependencies, milestones, responsibilities, monitoring, or closure. The most obvious issue concerns temporal consistency: the diagram presents a time horizon that differs from the one used in the case study. This result demonstrates how a formally plausible output can contain inconsistencies that are not immediately apparent and confirms the need for professional verification before operational use.

GanttTool produces the output that most closely aligns with the specialized logic of project management. The diagram breaks the project down into phases and sub-activities, depicts dependencies, identifies milestones, and assigns roles or responsibilities. This greater wealth of information directly supports planning, coordination, and monitoring functions. At the same time, the density of information and the granularity of the time scale reduce the diagram's immediate readability, requiring greater interpretive skills compared to the output of general-purpose systems.

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Table 2. Process indicators identified during the use of the tools

Indicator	ChatGPT	Gemini	GanttTool	Comparative Analysis	Evaluation Criteria
Speed of Generation	3	3	2	The two general-purpose systems quickly produce an initial proposal; GanttTool requires a more operational structure.	Number of steps required to arrive at the first usable output.
Ease of use	3	3	2	Conversational interfaces are more intuitive; GanttTool requires greater familiarity with Gantt chart logic.	Intuitive interaction and ease of understanding operations.
Editable	3	2	3	ChatGPT and GanttTool allow for very flexible revisions; Gemini is less structured when it comes to revising the observed plan.	Ease with which tasks, timelines, and structure can be updated.
Design Support	3	2	3	ChatGPT and GanttTool are better at supporting the overall structure; Gemini is more useful as an initial summary.	Ability to transform the description into a coherent operational plan.
Leadership support	2	1	3	GanttTool makes roles, dependencies, and milestones visible; ChatGPT primarily supports planning and communication.	Support for planning, coordination, accountability, and monitoring.
Monitoring	2	1	3	GanttTool is the most effective for tracking deadlines and reports; ChatGPT provides an overview; Gemini is more limited.	Ability to track tasks, deadlines, milestones, and progress.
Sharing	3	2	3	ChatGPT and GanttTool produce output that is easily transferable and shareable; Gemini is adequate but less structured.	Ease of exporting or sharing the results with the workgroup.
Customization	3	2	3	ChatGPT and GanttTool allow for more extensive customization; Gemini maintains a more basic structure.	Adaptability of the plan to the characteristics of the educational context.
Handling of unforeseen events	NR	NR	NR	T1 test not documented; indicator excluded from the comparison.	Not included in the T0 analysis.
AI literacy	3	2	2	Conversational interaction with ChatGPT makes the process of questioning, verifying, and critically reviewing the output more evident.	Opportunity to promote informed use, verification, and oversight of AI.
Affordability	2	3	3	In the context of the test, Gemini and GanttTool are more accessible; ChatGPT's accessibility may depend on the service tier used.	Sustainability of use in an educational context; conditions subject to change over time.

Methodological note. Process evaluations constitute exploratory assessments based on the described outputs and conditions of use; they are not validated experimental measures. The handling of unforeseen events was not evaluated through a common T1 test; the corresponding item is not included in the comparison.

Table 3. Comparative SWOT Analysis

Dimension	ChatGPT	Gemini	GanttTool
Strengths	Comprehensiveness of macro-phases; high readability; good representation of overlaps; effective summary.	Graphical simplicity; immediate comprehensibility; adherence to the main macro-actions.	High level of detail; dependencies; milestones; responsibilities; breakdown into phases and sub-activities.
Weaknesses	Graphical absence of dependencies, milestones, and responsible parties; some assumptions require verification.	Excessive generalization; missing management activities; absence of dependencies, milestones, and roles; different time horizon.	Very dense diagram; reduced readability; need to verify durations and overall consistency.

Opportunities	Quick support for educational planning, plan revision, and communication.	Useful for an initial overview of the project and for communicating the main actions.	Strong support for planning, coordination, monitoring, and assignment of responsibilities.
Threats	Risk of accepting automatically generated timing or organizational decisions as correct.	Risk of oversimplification and of accepting outputs with unverified dates.	The risk of delegating organizational decisions to the tool and confusing graphical precision with design accuracy.

Table 4. Emerging Comparative Profile

Tool	Emerging Profile	Main Strength	Main weakness
ChatGPT	A well-rounded, communicative general-purpose tool	Conciseness, readability, and flexibility in revision	Dependencies, milestones, and roles not explicitly shown in the diagram
Gemini	Essential general-purpose tool	Visual simplicity and speed	Comprehensiveness, organizational depth, and temporal consistency
GanttTool	Specialized project management tool	Structure, dependencies, milestones, and responsibilities	Graphical density and greater interpretive complexity

4. Discussion: Implications for Educational Leadership

The comparison shows that technological specialization does not automatically determine the overall superiority of a tool, but it does alter the nature of the support provided for planning. ChatGPT prioritizes a concise, readable, and easily communicable representation; Gemini provides a basic visualization of the main actions but exhibits greater challenges regarding completeness and temporal consistency; GanttTool produces a more structured representation of project relationships, closer to the professional logic of project management, albeit with greater visual complexity. These results are particularly relevant to educational leadership. In the case analyzed, the leader is not only called upon to define a sequence of activities but also to coordinate different stakeholders, assign responsibilities, monitor deadlines, identify critical issues, communicate the plan, and make decisions in the face of changes. The Gantt chart can therefore be interpreted as a mediating tool between planning and organizational action: it makes the relationships between activities visible, supports progress monitoring, and facilitates the sharing of the process with the various stakeholders. The analysis also highlights a dimension common to all three tools: the need for human supervision. The more detailed, orderly, and formally plausible the output appears, the greater the risk of attributing to it an unjustified decision-making authority. The temporal discrepancy observed in one of the outputs and the differing interpretations of the same input demonstrate that the schedule generated by artificial intelligence must be considered a proposal to be verified, negotiated, and adapted—not a final decision. From this perspective, AI literacy is a necessary condition for the responsible use of these tools. Competence lies not only in knowing how to formulate a request, but also in the ability to interpret the output, recognize omissions and inconsistencies, request revisions, understand the system's limitations, and maintain professional control over the decision-making process. Artificial intelligence can therefore support educational leadership in managing complexity, provided it is embedded within a framework of pedagogical intent, critical oversight, and professional responsibility.

4.1 Discussion of the Results: Pedagogical Implications, Educational Leadership, and Research Perspectives

The comparison between ChatGPT, Gemini, and GanttTool highlights that the three tools cannot be simply distinguished in terms of better or worse performance but must be interpreted in relation to the different functions they can fulfill within the planning process. The characteristics of the analyzed outputs, in fact, reveal different ways of organizing information, representing activities, and supporting planning, coordination, and monitoring operations. ChatGPT emerges as the most balanced tool in the initial phase of schedule development, as it combines a good ability to structure information with a high level of readability and communicative clarity. Its main strength lies in transforming a complex narrative description into an orderly temporal representation, accessible even to professionals who lack specialized project management skills. This feature is particularly important during the early stages of design, when it becomes necessary to share an overall view of the process, identify the main macro-activities, and highlight the temporal overlaps between different actions. However, this simplicity of representation also poses a limitation, as the diagram examined does not graphically illustrate dependency relationships, milestones, or the assignment of responsibilities. The use of this tool therefore requires subsequent intervention by the project manager when the schedule must take on a more analytical and operational role. Gemini, on the other hand, offers a more streamlined representation, in which project information is distilled into the main macro-actions. This ability to synthesize information allows for the rapid creation of an initial project map and can be useful for communicating its fundamental components. In the case analyzed, however, this simplification results in a loss of detail regarding certain central aspects of the organization, including monitoring, dependencies between activities, milestones, and the assignment of responsibilities. Added to these elements is the temporal discrepancy observed in the output, which constitutes a significant issue regarding the tool's use for operational planning . The presence of a representation that is formally plausible but not fully consistent with the project's time horizon demonstrates that graphical readability cannot be taken as a guarantee of project accuracy. Gemini therefore appears to be particularly useful for initial summarization, while its use for management activities requires a particularly careful verification of the information produced. GanttTool has a different profile, one that is more oriented toward the analytical structuring of the project and the specific needs of project management. Its specialization allows for the explicit representation of dependencies, milestones, and the assignment of roles and responsibilities, organizing activities at a higher level of detail than general-purpose tools. This wealth of information can support coordination, monitoring, and control functions, making it possible to identify critical steps and recognize the interdependencies between individuals and activities. At the same time, the greater graphical density and granularity of the representation make the output less intuitive and require more specific interpretive skills. The comparison therefore suggests that technological specialization does not automatically determine overall superiority but results in different conditions of use depending on the requirements of the design process.

Based on this evidence, the choice of tool appears to be closely linked to the stage of the design process and the nature of the decisions to be supported. When the primary need is to communicate and share a general overview of the project, ChatGPT offers a concise and sufficiently detailed representation of the activities; when it is necessary to quickly identify the main macro-actions, Gemini can serve as a resource for an initial organization of information, provided that this is accompanied by a check for completeness and consistency; when, on the other hand, planning must translate into an operational framework for task assignment, deadline tracking, and dependency management, GanttTool offers features that are better suited to these needs. The most significant finding of the study, therefore, does not lie in identifying a universally preferable tool, but in recognizing different levels of support for educational planning and leadership. In school settings, in fact, the coordination of a complex project goes beyond simply defining activities; it also involves the distribution of responsibilities, resource management, communication among stakeholders, monitoring progress, and making decisions in response to conditions that arise during its implementation. From this perspective, the Gantt chart can be interpreted as a mediating tool between the planning phase and organizational action, insofar as it makes the relationships between activities visible and provides a shared reference point for discussing priorities, constraints, and responsibilities. However, the ability to generate a schedule using artificial intelligence tools does not eliminate the need for professional oversight. The more orderly, detailed, and formally convincing an output appears, the greater the risk of attributing to it a level of reliability that has not been adequately verified. The omissions found in general-purpose diagrams, the temporal discrepancies observed in Gemini, and the need to verify the organizational assumptions underlying the outputs highlight that automated output should be viewed as a proposal to be examined and contextualized, rather than a final decision. From this perspective, AI literacy takes on a cross-cutting role, as it requires not only the ability to formulate requests to the tools but also the ability to critically interpret the responses, identify errors and inconsistencies, recognize missing information, and maintain control over design choices.

The interpretation of results can be further explored through certain pedagogical dimensions, with particular reference to agency, transparency of decisions, task authenticity, collaboration, and professional control. However, it is necessary to distinguish between the characteristics actually observed in the outputs and the possible effects that the use of these tools might have on professionals. The available documentation allows for an analysis of the technological and organizational conditions offered by the three systems, but does not enable a direct measurement of changes in users' behaviors, competencies, or modes of participation. With regard to agency, the ability to modify, supplement, or reorganize the schedule represents a potentially significant feature for the exercise of initiative and professional judgment. From Bandura's (2001) sociocognitive perspective, agency refers to an individual's capacity to intentionally direct their own actions, anticipate their consequences, self-regulate, and reflect on the decisions made. Biesta et al. (2015) also highlight how teacher agency must be understood in relation to the cultural, structural, and material conditions within which educational action takes place. In light of these contributions, the possibilities for revision and customization offered by the tools can be interpreted as conditions that are

potentially conducive to the exercise of an active planning role, without this allowing us to assert an actual increase in the agency of the professionals involved. Decision transparency, on the other hand, concerns the ability to identify, within the diagrams, the information that guides planning, the relationships between activities, and the responsibilities assigned to the individuals involved. From this perspective, GanttTool provides greater clarity regarding dependencies, milestones, and roles, while the outputs from ChatGPT and Gemini require additional work to make these elements fully visible. Professional oversight therefore takes on particular importance, since the comprehensibility of the representation must be accompanied by the ability to verify its accuracy, discuss its assumptions, and modify its components when necessary. A further dimension concerns the authenticity of the design task. Herrington et al. (2006) recognize the value of authentic activities in learning, emphasizing the importance of tasks linked to meaningful situations and characterized by the need to integrate knowledge, decisions, and resources. In the case under consideration, the creation of a Gantt chart for a PNRR project aimed at preventing and combating early school leaving constitutes an activity that addresses the specific needs of educational and organizational planning. Authenticity is therefore considered in relation to the relevance of the task and the consistency of the representations produced with the objectives and constraints of the scenario, without confusing project simulation with the actual management of a school intervention. Similarly, the readability and shareability of timelines can create favorable conditions for dialogue among the various stakeholders within the organization, but they do not in and of themselves constitute proof of collaboration. In the case analyzed, in fact, no structured interactions among groups of professionals aimed at the joint creation and review of outputs were documented. Collaboration can therefore be discussed as a potential feature of project representations, not as an empirically measured outcome. Taken together, these dimensions allow us to recognize the pedagogical value of the timeline not only in its ability to organize activities but also in its capacity to make the choices behind them understandable, to facilitate discussion, and to maintain an open space for professional reflection. These considerations must be interpreted in light of the study's methodological limitations. The exploratory-comparative design is based on a single project case and on three tools, whose characteristics and functionalities can change rapidly as a result of platform updates. The results are therefore not generalizable to other contexts or different technological configurations and do not allow for the construction of an absolute ranking of performance. Even the SWOT analysis, while offering a useful framework for organizing and comparing the observed evidence, serves a descriptive-interpretive function and does not constitute a causal measure of the tools' effectiveness. A further limitation concerns the documentation of the procedure, since the available version of the study does not yet specify the number of evaluators, the methods used to assign scores, the versions of the systems used, or the actual dates of the original T0 tests. This information will need to be reconstructed using preserved records and artifacts in order to enhance the transparency and replicability of the comparison. Furthermore, the absence of documented evidence involving real users does not allow for an empirical verification of the effects of using the tools on agency, collaboration, and decision-making processes. The T1 phase, which involves revising timelines in the event of an organizational contingency, is still planned and therefore does not contribute to the

results discussed in this version. Looking ahead, extending the pilot to more project cases, introducing more structured evaluation procedures, documenting interactions with the tools, and directly involving administrators, teachers, and educators could allow for a deeper exploration of the conditions under which artificial intelligence concretely supports educational design and leadership. Furthermore, a comparison between initial and subsequently revised timelines would be of particular interest, in order to verify the tools' ability to respond to organizational l changes while maintaining consistency among objectives, activities, timelines, and responsibilities. In this regard, the evidence gathered suggests that the contribution of artificial intelligence to educational planning should be sought not only in the efficiency of automated production but, above all, in the possibility of integrating different tools into informed decision-making processes, in which critical evaluation, professional responsibility, and attention to contextual conditions retain a central role.

5. Conclusions

With regard to RQ1, the T0 outputs described highlight differences in representation methods and level of detail: ChatGPT favors a broad overview, Gemini a more concise summary, and GanttTool the clarification of relationships and responsibilities. With regard to RQ2 and RQ3, the analysis suggests that the value for educational leadership depends on the task at hand and the professional review of timelines. The available evidence does not allow for inferences regarding improvements in agency, effective collaboration, or the management of unforeseen events—the latter being the focus of the T1 test.

The comparison suggests that the three tools offer different forms of support for educational planning: general-purpose systems primarily facilitate synthesis, communication, and reformulation, while the specialized tool makes dependencies, milestones, and responsibilities more explicit. In all cases, the output requires human oversight and should be treated as an artifact to be verified and contextualized, not as an automatic decision.

Note on the tables: For "Strengths" and "Opportunities," a high score indicates greater suitability; for "Weaknesses" and "Threats," a high score indicates a more critical issue. The process scores represent a comparative assessment within the test setting and should be interpreted in relation to the conditions of use observed at the time of the experiment.

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