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Transdisciplinary Integration of Digital Psychopedagogy, Educational Psychodynamics, and Language-Learning Strategies in Foreign-Language Education: A Mixed-Methods Quasi-Experimental Study

Prof Mahmoud Naanneh[1]*, Dr Naseem Atef Assadi[2], Maria Anna Formisano[3],[4]

[1]Achva College and Academy of the Arabic Language- Haifa

[2]Sakhnin College for Teacer Education

[3]School Principal, Ministry of Education and Merit, Italy,

[4]Psychologist and PhD in Educational Research Methodology, University of Salerno, Italy.

***Corresponding Author**

Prof Mahmoud Naanneh

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Abstract:

Background: There is an increasing demand in foreign language classrooms for pedagogies that link language learning with learners' cognitive, emotional, social and digital lives. Language learning strategies, multimodal digital tools and psychodynamic perspectives have all been researched in isolation, but the integration of these into a single classroom model has not been explored. This study looks at whether a transdisciplinary instructional model which brings together explicit strategy instruction, multimodal digital composing and psychologically informed learner support will lead to improved strategy use, language performance, engagement and language anxiety for university students learning German.

Purpose: To investigate the effects of a 12-week transdisciplinary intervention (in comparison to conventional strategy instruction and regular instruction) on learners' cognitive, metacognitive, social, affective and digital-multimodal strategy use; integrated language proficiency; engagement and foreign language anxiety.

Methods: A convergent mixed methods quasi-experimental design was employed. The sample consisted of 180 undergraduate students of German as a foreign language, who were assigned to three intact classes: a transdisciplinary multimodal group (n=62), a conventional strategies group (n=59) and a comparison group (n=59). The quantitative data comprised a strategy questionnaire, an integrated language test, engagement and anxiety scales and classroom observations. The qualitative data comprised 24 student interviews (semi-structured), student reflective journals and teacher field notes. Analyses used were ANCOVA, repeated measures analysis, correlation analysis and thematic analysis.

Results: The transdisciplinary group had the largest gains in language performance (M change = 20.7), followed by the conventional strategies group (M change = 11.5) and the comparison group (M change = 5.5). After controlling for pre-test scores the transdisciplinary

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group was significantly superior to both comparison conditions on all aspects of integrated language performance (strategy use, engagement and anxiety reduction). The greatest gains were in the areas of metacognitive and digital-multimodal strategies. Engagement was positively related to language gain (r = .68) and anxiety was negatively related to gain (r = −.54). The qualitative data identified four mechanisms: meaningful multimodal expression, metacognitive awareness, emotional safety and collaborative identity work.

Conclusion: The findings suggest that language learning strategies are most effective when they are part of an emotionally supportive, multimodal and digitally enhanced learning environment. The study provides a transferable framework for foreign language teachers who wish to bring together literature, languages, psychology and digital pedagogy.

Keywords: language learning strategies; multimodal digital pedagogy; educational psychodynamics; German as a foreign language; learner engagement; language anxiety; transdisciplinary education.

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1. Introduction

Language teaching has moved well beyond the old paradigm of just getting the grammar right and the vocab right. The classroom today is a product of global mobility, cultural diversity, the ubiquity of digital communication and a realisation that learning is cognitive, social and emotional. The teacher of a foreign language is therefore not just expected to teach the language but to help the learner to regulate their own learning, to interpret a range of multimodal texts, to work with others who are different and to develop confidence as a communicator. This is very much the case in the teaching of German as a foreign language where the learner is faced with an extremely complex grammar, a whole raft of cultural references and the emotional exposure of speaking a language they don't know.

Language learning strategies have always been viewed as the conscious strategies that learners employ in order to improve their acquisition, retention, retrieval and use of a language. Cognitive strategies are things like repetition, summarising, inferencing and contextual guessing. Metacognitive strategies are planning, monitoring and evaluating. Social strategies are things like asking for clarification and working with others. Affective strategies are about reducing anxiety, self encouragement and so on. Research over the years has continued to show a link between strategy use and achievement, though it's not a direct one. The strategies work when they are appropriate to the task, the learner and the classroom context.

At the same time digital technologies have changed what it means to communicate in another language. The learner is now producing texts that are a combination of written language, images, audio, video, gesture and design. Multimodal digital composing enables the creation of podcasts, digital stories, video presentations, interactive glossaries and co-created visual essays. This can make the abstract nature of linguistic knowledge more tangible and provide a real purpose for communication. There is some evidence that AI supported and multimodal vocabulary instruction can lead to improved gains and retention of vocabulary, particularly when the instruction is contextual and multimodal rather than just drill.

However digital multimodality in itself doesn't guarantee learning. Students can be distracted by the tools, have unequal access to the tools, or end up with very visually attractive work which is in no way necessarily linguistically engaging. A psychological perspective is therefore essential. Educational psychodynamics is the study of the unconscious and emotional dimensions of learning: the fear of failure, the negotiation of identity, defensiveness, motivation, the need to belong, the learner's relationship with authority and with peers. In the context of language learning this is of particular relevance as speaking a language in another language is a context in which you are very likely to be corrected, to be embarrassed and to be uncertain.

The study in question addresses these issues by proposing a transdisciplinary model which brings together three strands: explicit instruction in language learning strategies; a multimodal digital pedagogy which is rooted in literature and culture; and educational psychodynamics which takes into account emotional safety, motivation and learner identity. Rather than seeing the components of technology, psychology and strategy as discrete add-ons to language teaching, the model positions them as interlocking conditions for genuine learning.

The study was driven by four research questions. To what extent does the transdisciplinary intervention lead to improved use of cognitive, metacognitive, social, affective and digital-multimodal strategies compared to conventional strategy instruction and regular instruction? To what extent does the intervention lead to improved integrated German performance in the four language skills (reading, writing,

speaking and listening)? How do levels of engagement and foreign language anxiety change across the three conditions and how are they related to language gains? Through what classroom processes do students experience the intervention as being supportive or as being challenging?

The paper makes a contribution to research in the areas of the arts, literature, languages and teaching and learning more generally by demonstrating how literary texts can be used as multimodal resources in language development. Literary texts are inherently open to interpretation, to empathy and to personal response and when combined with digital production they can become sites in which learners can use their new linguistic resources in a personally meaningful way. It also responds to the call for teacher education in multimodal literacy, translanguaging and psychologically informed pedagogy.

2. Literature Review

2.1 Language-Learning Strategies and Self-Regulation

Research into language learning strategies has moved from a focus on the individual techniques to a focus on how learners regulate their own learning in the context of the classroom. The self-regulated learner sets goals, selects appropriate strategies, monitors their own learning, manages their emotions and adjusts their behaviour in response to feedback. A recent systematic review of self-regulated learning in ELT found that formative feedback, self and peer assessment and an autonomy-supportive climate were all consistently linked to better performance and more self-regulated learning. The effectiveness of these was, however, contingent upon teacher assessment literacy and the classroom context.

This is obviously pertinent to foreign language teaching as language learning is all about repeated exposure to difficulty. A learner coming across a German word they don't know might guess from context, look it up in a digital dictionary, ask a classmate, put it in their own personal glossary or simply give up and move on. The difference between those responses is not simply a difference in linguistic knowledge but a difference in strategic awareness and in emotional disposition. Strategy instruction therefore shouldn't be delivered as a list of techniques. It should be about helping the learner to become aware of when a strategy is appropriate, to assess its impact and to adapt it to a new situation.

Recent research also makes a distinction between direct and indirect pathways from strategies to achievement. Indirect strategies (metacognitive planning, affective regulation etc) can support achievement both in their own right and by enabling more effective use of direct cognitive strategies. The implication is that teachers should be concentrating on planning, reflection, collaboration and emotional support rather than just on the practice of the strategies themselves.

2.2 Multimodal Digital Pedagogy and Literature

Multimodal pedagogy acknowledges that meaning is constructed through more than just words. Images, sound, spatial design, gesture, colour and movement all contribute to communication. In the context of language teaching, multimodal tasks might take the form of digital storytelling, video journals, annotated scenes from a text, audio recordings, visual vocabulary maps and collaborative online exhibitions. They provide learners with a range of ways of accessing a text and a range of ways of demonstrating their understanding.

Literature is absolutely the way to go in this respect. A short story, a poem, a song, a film clip, a graphic novel etc can be a fantastic source of rich, authentic language input and at the same time will trigger an emotional and interpretive response. Take a German short story on the theme of migration, memory or friendship for instance. This could be the starting point for a digital narrative in which the students retell the story, conduct character interviews, create visualisations of the setting and produce their own reflective commentaries. In such an exercise language is not something that is studied in isolation. It is a means of expressing interpretation and identity.

Recent research into digital multimodal composing has demonstrated that it can be a vehicle for engagement and language development. However, teachers require ongoing professional development to be able to design the tasks appropriately. Research into bilingual digital multimodal composing has shown that teachers can develop their multimodal knowledge and capacity to design as a result of professional development, although they still required some level of contextualised support. The same has been found in relation to place-based multimodal approaches which have been used to enhance the professional learning of bilingual teachers. The upshot of all of this is that successful multimodal pedagogy is not simply about having the technology available; it is about the design of the tasks, the clarity of the language aims and the use of the learners' cultural resources.

2.3 Educational Psychodynamics in Language Learning

Educational psychodynamics looks at how the unconscious (wishes, fears, defences, relational patterns) impacts learning. In a language classroom you can have students who won't speak at all because they're terrified of being ridiculed, who are overly dependent on the teacher's approval, who will compete with each other, who will identify negatively with the language itself. These aren't just motivational problems. They are defensive responses to a perceived threat.

A psychodynamically informed classroom doesn't in any way substitute language teaching for therapy. What it does is create the conditions in which learners can take

intellectual risks. The teacher can normalise the occurrence of error as part of the learning process, provide the kind of predictable routines that learners need, give them choice, give constructive feedback and design tasks which are collaborative in nature and which therefore reduce the amount of public exposure. Reflective journals, anonymous exit questions and small group discussion are all useful in helping the learner to articulate their anxieties without being required to do so in a public forum.

This is particularly relevant in literature-based language teaching. Literary texts will always trigger personal memories, cultural assumptions and emotional reactions. If you deal with them appropriately these can be a very powerful tool in terms of developing both comprehension and language use. If you don't take them on board or force them then you can in fact cause discomfort and disengagement. The teacher's job is to set the boundaries, to invite the interpretation and to ensure that the discussion stays in a pedagogically appropriate and respectful space.

2.4 Transdisciplinary Integration

Transdisciplinarity is about bringing together different disciplines to address a common educational problem. The disciplines in this case are language pedagogy, educational psychology, digital humanities and literary education. It's not simply an additive process. Strategy teaching gives the learner the tools for self-regulation; multimodal digital pedagogy provides the authentic means of expression; psychodynamics brings in an awareness of the emotional conditions under which the learner can use those tools.

Recent work has started to make the case for this integration. Ekebuike, Bushi and Assadi have proposed a transdisciplinary framework that brings together geoinformatics, educational psychodynamics and digital language pedagogy. They stress that learning environments need to be viewed as spatial, psychological and technological systems. Of course their work is very much centred on geoinformatics but the point they are making is one that is very relevant to our discussion: digital language pedagogy is enhanced when it takes account of the psychological experience of the learner and the material conditions of learning.

Multicultural and multilingual education also supports this approach. Widjanarko and Andaryani assert that early exposure to multicultural education can go some way towards preventing intolerance by fostering respect for diversity, empathy and inclusive values. The same is true in higher education language classrooms where learners come to the language classroom with all sorts of linguistic repertoires, all sorts of cultural histories and all sorts of emotional relationships. A transdisciplinary classroom should see this diversity as a resource rather than a problem.

3. Methods

3.1 Research Design

The study employed a convergent mixed methods quasi-experimental design with three intact classes. A quasi-experimental design was used as the students were already in their existing course sections and we were not able to randomly assign individuals. Quantitative and qualitative data were collected pre-intervention, during the intervention and post-intervention. The quantitative component looked at changes in strategy use, language performance, engagement and anxiety. The qualitative component looked at the students' experience of the intervention and the classroom processes which either supported or impeded learning.

The three conditions were: (a) a transdisciplinary multimodal group who got explicit strategy instruction, literature based multimodal digital tasks and psychologically informed classroom practice; (b) a conventional strategies group who got explicit strategy instruction and conventional language tasks (no digital multimodal production); and (c) a comparison group who followed the normal communicative language curriculum with no systematic strategy training or multimodal production.

3.2 Participants

Participants were 180 undergraduates studying German as a foreign language at a university faculty of foreign languages. All were aged between 18 and 27 and had completed at least one semester of German prior to the study. The sample was quite diverse in terms of linguistic and cultural background. Participation was entirely voluntary and those who chose not to participate simply carried on with their normal course work without providing any research data.

Table 1 shows the distribution of participants across groups and their demographic characteristics. The groups were broadly similar in terms of age, gender balance, prior study of German and self reported digital confidence. As intact classes were used, any baseline differences were dealt with via analysis of covariance and by looking at the results in the context of the qualitative data.

Table 1. Participant characteristics by group

Characteristic	Transdisciplinary multimodal group	Conventional strategies group	Comparison group	Total
Number of students	62	59	59	180
Mean age in years	20.4	20.7	20.5	20.5
Female students	36	34	33	103
Male students	24	23	24	71
Non-binary/prefer not to say	2	2	2	6
Mean semesters of German	2.6	2.5	2.6	2.6
High digital confidence (%)	48.4	47.5	45.8	47.2
Reported prior literature-based tasks (%)	35.5	33.9	32.2	33.9

3.3 Intervention

The intervention was 12 weeks in duration and delivered in normal course hours. There were two 90-minute lessons per week. The transdisciplinary multimodal group completed six two-week cycles. Each cycle commenced with a literary or cultural text, followed by explicit strategy instruction, collaborative comprehension, digital multimodal production, peer feedback and reflective evaluation.

The literary texts were short stories, poems, song lyrics, film clips and graphic narratives all relating to identity, mobility, memory, friendship and intercultural encounter. The students produced a range of digital artefacts including audio recordings of story retellings, annotated visual essays, short video dialogues, multilingual glossaries, podcast segments and collaborative digital exhibitions. The teacher would introduce one or two strategies in each cycle e.g. predicting from visual cues, monitoring for comprehension, using contextual inference, planning a multimodal text, managing speaking anxiety and evaluating peer feedback.

Psychodynamically informed practice involved predictable lesson routines, low stakes rehearsal prior to public performance, anonymous reflection prompts, structured feedback protocols and opportunities for students to choose their topic or mode of expression. The teacher was very explicit about errors being a source of information for learning and the feedback from peers was always first focused on meaning and only then on form.

The conventional strategies group got the same strategy instruction and the same literary content, though they were mainly doing written summaries, oral presentations and the usual type of comprehension exercises. The comparison group followed the normal syllabus which would have been textbook based grammar, vocabulary, reading, listening and speaking.

3.4 Instruments

Strategy use was assessed via a 35-item questionnaire which had been adapted for the study. The questionnaire measured five dimensions of strategy: cognitive, metacognitive, social, affective and digital-multimodal. The items were scored on a 5 point Likert scale (1 = never, 5 = always). The digital-multimodal subscale comprised items relating to the use of images, audio, video, digital glossaries and online collaboration to support language learning.

Integrated language performance was assessed via a pre-test and post-test derived from the course learning outcomes. The test comprised a reading comprehension task, a guided writing task, a listening comprehension task and a recorded speaking task. Each of the tasks was scored using an analytic rubric which assessed content, organisation, vocabulary, grammar, pronunciation/intelligibility and communicative effectiveness. The maximum possible score was 100. Two trained raters scored the writing and speaking tasks and inter-rater agreement was good.

Engagement was assessed via a 12-item scale measuring behavioural, emotional and cognitive engagement. Foreign language anxiety was assessed via an adapted classroom anxiety scale covering speaking anxiety, fear of negative evaluation and communication apprehension. Classroom observations were carried out every second week using a structured protocol which recorded levels of participation, collaboration, use of strategy, use of technology and the emotional climate.

Qualitative data came from 24 purposively selected students (8 from each group) in the form of semi-structured interviews. The interviews covered students' experiences of strategy use, digital tasks, literature, feedback, confidence and anxiety. The students in the transdisciplinary group also wrote short reflective journals after each two week cycle. Teacher field notes recorded the implementation decisions, student reactions and difficulties.

3.5 Data Analysis

Quantitative data were analysed using descriptive statistics, repeated measures analysis, one way ANCOVA with pre-test scores as covariates and Pearson correlations. Effect

sizes were reported as partial eta squared. Assumptions of normality and homogeneity of variance were checked prior to any inferential testing. As we were looking at intact classes the results were interpreted with an eye to possible clustering and non-random assignment.

Qualitative data were analysed thematically. The interview transcripts, journal entries and field notes were all read through multiple times, coded inductively and grouped into potential themes. The codes were then cross referenced across groups and data sources. The themes were then refined until they represented the patterns that were emerging across the dataset. A subset of the interview participants were member checked and peer debriefing was carried out to reduce the risk of interpretative bias.

Integration was a convergent design. The quantitative findings told us what had changed and the qualitative findings told us how and why that change had occurred. We had joint displays to allow the statistical findings to be compared with the thematic findings.

4. Results

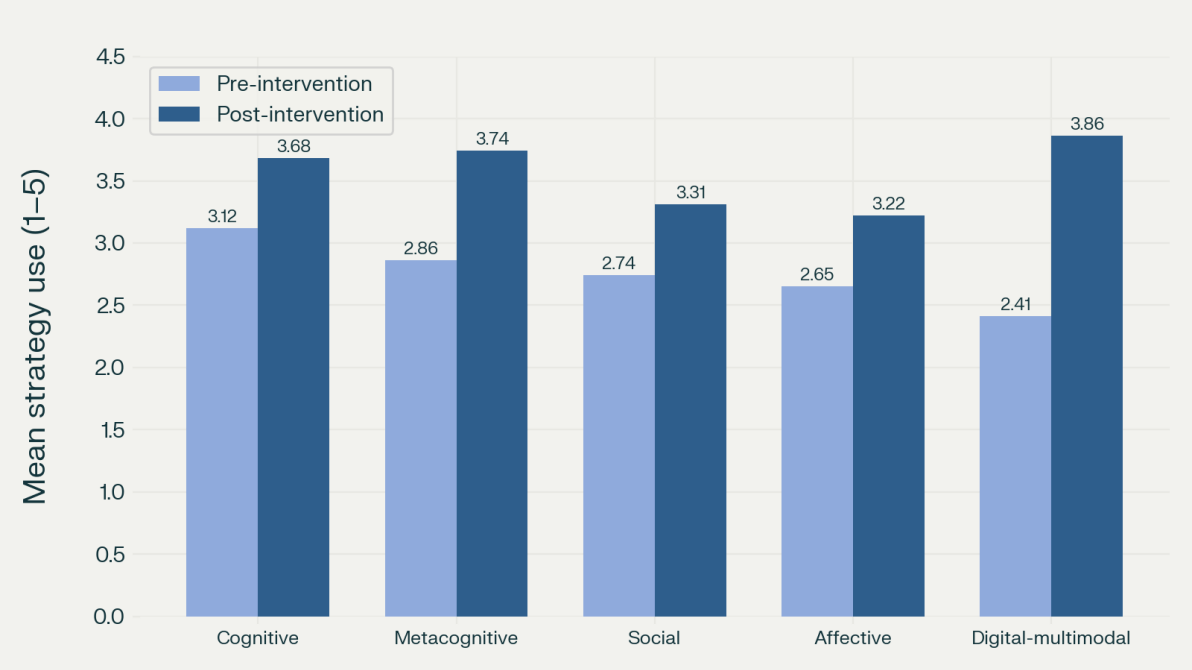
4.1 Changes in Strategy Use

Table 2 shows the mean strategy use scores pre and post intervention. All groups showed some improvement but the transdisciplinary multimodal group had the largest increase in every strategy category. The biggest increase was in the digital-multimodal strategies, then in the metacognitive strategies. This indicates that the multiple opportunities to plan, produce and evaluate multimodal artefacts in the intervention helped students to embed the strategic behaviour.

Table 2. Mean strategy-use scores before and after the intervention

Strategy dimension	Group	Pre-test M	Post-test M	Mean change
Cognitive	Transdisciplinary	3.18	3.79	0.61
Cognitive	Conventional strategies	3.09	3.46	0.37
Cognitive	Comparison	3.08	3.21	0.13
Metacognitive	Transdisciplinary	2.91	3.86	0.95
Metacognitive	Conventional strategies	2.84	3.40	0.56
Metacognitive	Comparison	2.83	2.98	0.15
Social	Transdisciplinary	2.78	3.44	0.66
Social	Conventional strategies	2.72	3.14	0.42
Social	Comparison	2.71	2.86	0.15
Affective	Transdisciplinary	2.69	3.36	0.67
Affective	Conventional strategies	2.64	3.03	0.39
Affective	Comparison	2.62	2.77	0.15
Digital-multimodal	Transdisciplinary	2.46	3.97	1.51
Digital-multimodal	Conventional strategies	2.42	2.91	0.49
Digital-multimodal	Comparison	2.39	2.58	0.19

Figure 1 shows the overall pre and post intervention strategy scores for the transdisciplinary multimodal group. The pattern in the figure clearly shows that the intervention didn't just result in increased use of technology, it also resulted in an improvement in the metacognitive, social and affective aspects of learning.



The ANCOVA results were significant ($F(2,176) = 48.62$, $p < .001$, partial $\eta^2 = .36$) indicating a significant difference between the groups in post-intervention strategy use after taking into account pre-test scores. Post hoc tests revealed that the transdisciplinary group scored significantly higher than both the conventional strategies group and the comparison group. The conventional strategies group also scored significantly higher than the comparison group, thus confirming that the effect of explicit strategy instruction was positive even in the absence of a great deal of multimodal production.

4.2 Language Performance

Table 3 shows the pre-test, post-test and adjusted post-test scores for integrated language performance. The groups were similar at pre-test. By post-test the transdisciplinary multimodal group had a mean score of 83.5 as opposed to 74.6 in the conventional strategies group and 67.9 in the comparison group.

Table 3. Integrated language performance by group

Group	n	Pre-test M	Pre-test SD	Post-test M	Post-test SD	Adjusted post-test M	Mean gain
Transdisciplinary multimodal	62	62.8	8.1	83.5	7.4	83.2	20.7
Conventional strategies	59	63.1	8.4	74.6	8.0	74.3	11.5
Comparison	59	62.4	8.7	67.9	8.6	68.4	5.5
Total	180	62.8	8.4	75.5	9.6	—	12.7

Figure 2 shows the performance gains across the three conditions. The difference between the transdisciplinary group and the other groups was most obvious in writing and speaking where students had the opportunity to plan, rehearse, revise and present their multimodal work.



ANCOVA showed a significant group effect on adjusted post-test performance, $F(2,176) = 61.24$, $p < .001$, partial $\eta^2 = .41$. The transdisciplinary multimodal group significantly outperformed both of the comparison conditions. The conventional strategies group also significantly outperformed the comparison group. So strategy instruction did have an effect on performance, but the addition of the literature-based multimodal production and the psychologically supportive practices led to considerably greater gains.

4.3 Engagement, Anxiety, and Language Gain

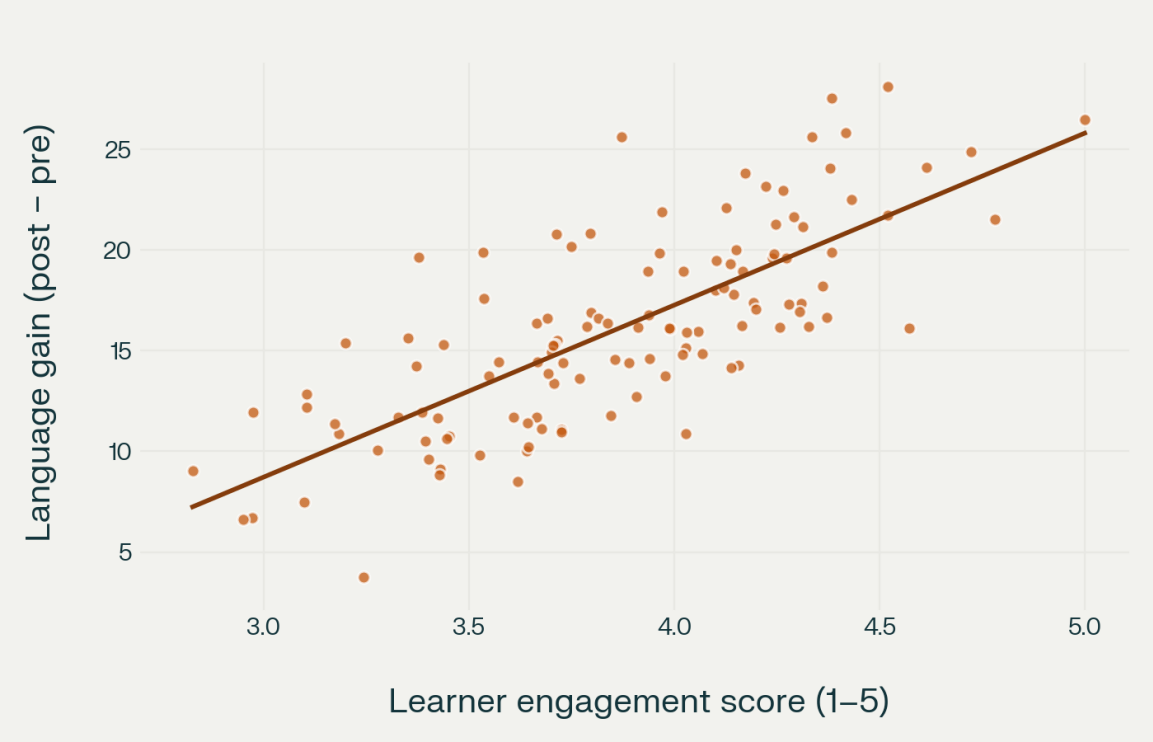
Engagement went up the most in the transdisciplinary multimodal group. Their mean engagement score increased from 3.24 to 4.21 (on a 5 point scale). The conventional strategies group went from 3.21 to 3.68 and the comparison group from 3.18 to 3.35. The transdisciplinary group also had the largest reduction in foreign language anxiety (from 3.52 to 2.61). The conventional strategies group went from 3.49 to 3.08 and the comparison group from 3.55 to 3.39.

Table 4. Engagement and anxiety by group

Variable	Group	Pre-test M	Post-test M	Change
Engagement	Transdisciplinary multimodal	3.24	4.21	+0.97
Engagement	Conventional strategies	3.21	3.68	+0.47
Engagement	Comparison	3.18	3.35	+0.17
Foreign-language anxiety	Transdisciplinary multimodal	3.52	2.61	−0.91
Foreign-language anxiety	Conventional strategies	3.49	3.08	−0.41
Foreign-language anxiety	Comparison	3.55	3.39	−0.16

Across the whole sample engagement was positively correlated with language gain ($r = .68$, $p < .001$). Foreign language anxiety was negatively correlated with language gain ($r = -.54$, $p < .001$). Within the transdisciplinary group the link between engagement and gain was as strong as it was in the overall sample, again pointing to the fact that the more engaged students were in the multimodal tasks the greater their language gain.

Figure 3 shows the relationship between engagement and language gain. Again, correlation doesn't imply causation, but the pattern is in line with the qualitative finding that in the case of meaningful, low-threat tasks students were much more likely to engage and thus had more opportunities to learn the language.



4.4 Qualitative Themes

Thematic analysis produced four main themes: meaningful multimodal expression, metacognitive awareness, emotional safety, and collaborative identity work. These themes explain the quantitative differences between groups.

The first theme, meaningful multimodal expression, referred to students' perception that digital tasks allowed them to show understanding in more than one way. One student explained that creating a video version of a short story helped her understand character motivation because she had to choose images, music, and spoken words carefully. Another student reported that recording a podcast made him rehearse pronunciation more willingly than an ordinary oral exam because the audience felt more authentic.

The second theme, metacognitive awareness, described students' growing ability to plan and evaluate their learning. Many students in the transdisciplinary group reported using planning sheets before digital production and reflecting after peer feedback. They described checking whether their vocabulary choices matched the message, whether their audio was understandable, and whether their visual choices supported the story. This finding corresponds with the quantitative increase in metacognitive strategy use.

The third theme, emotional safety, captured the importance of rehearsal, choice, and non-punitive feedback. Students said that being allowed to record a speaking task before submitting it reduced fear of immediate correction. Several students noted that anonymous reflection prompts helped them admit confusion without embarrassment. One student stated that the classroom felt less like a test and more like a workshop. This finding helps explain the larger anxiety reduction in the transdisciplinary group.

The fourth theme, collaborative identity work, concerned students' use of their own cultural and linguistic backgrounds when interpreting literary texts. Students compared characters' experiences with their own experiences of mobility, family expectations, language learning, and belonging. In group discussions, some students used English or their first language to clarify ideas before expressing them in German. Rather than viewing this as a failure to use the target language, the teacher treated it as a transitional resource that supported comprehension and participation.

Table 5. Integration of quantitative and qualitative findings

Quantitative result	Qualitative explanation	Pedagogical implication
Largest gain in metacognitive strategies	Students used planning sheets, reflection prompts, and peer-feedback protocols	Teach planning and evaluation explicitly within authentic tasks
Largest gain in digital-multimodal strategies	Students created videos, podcasts, visual essays, and digital glossaries	Use digital production for communicative purposes, not decoration
Greatest language-performance gain	Literary texts provided meaningful content for interpretation and retelling	Connect language objectives to literature and culture
Largest anxiety reduction	Rehearsal, choice, predictable routines, and constructive feedback reduced threat	Create low-stakes opportunities before formal assessment
Strong engagement-gain relationship	Students reported ownership, curiosity, and audience awareness	Design tasks with authentic audiences and learner choice

5. Discussion

The findings support the study's central contention that language learning strategies are most effective when they are part of a multimodal, culturally relevant and emotionally supportive learning environment. The advantage of the transdisciplinary group cannot be down to the use of technology per se. The students in that group also received explicit instruction in how to plan, monitor, collaborate and regulate emotion. It's not just the strategy training that accounts for the difference either as the conventional strategies group performed less well than the transdisciplinary group. The real difference appears to be in the interaction between the strategy instruction, the literary multimodal production and the psychological safety.

The real growth is in the metacognitive strategies. The students didn't just use the tools, they were learning to ask questions like: What is my communicative goal? What resources do I need? How will I know that my audience has understood me? What will I do to revise in light of feedback? Those are the markers of self-regulated learning. They are also the markers of how multimodal tasks can make the learning process visible. An essay is a very good example of this in that the planning behind it is invisible. A video or a podcast however requires decisions about sequence, voice, image, sound and audience.

The findings also build on prior work in the area of digital multimodal composing. Previous research has demonstrated that AI-assisted and multimodal vocabulary learning can lead to improved vocabulary acquisition and retention when it incorporates contextual priming and multimodal scaffolding. The current study suggests that the same principles are at play in other areas. When students use digital tools to engage with literature they are in effect doing all the language skills (reading, listening, speaking, writing and intercultural interpretation) in a single, integrated task. The digital product is both a language learning task and an artistic response.

The reduction in anxiety is the major finding. Foreign language anxiety is often exacerbated by the fear of negative evaluation and the sense that you can't express your identity in the language. The intervention worked by removing that threat through the provision of rehearsal, choice and the presentation of feedback as revision rather than as judgement. That's very much in keeping with psychodynamic principles in that when you feel safe, defensive avoidance goes down and you can engage. Crucially the teacher did not ask the students to go into any private emotional territory. What was provided was a series of structured, bounded opportunities for reflection.

Literature has to be stressed in this respect. Literature provided students with something to talk about. It wasn't about producing language for the sake of it. It was about interpreting characters, conflicts, the cultural assumptions and the emotional experience of the text. That is exactly what the wider purpose of the arts and humanities is: to develop the ability to interpret, to empathise, to think critically and to express oneself. Literature is therefore not a nice bit of content to throw in, it is at the heart of what we are trying to achieve in language teaching.

The findings also point to the value of a multicultural and multilingual approach. The students were using their full linguistic repertoire in the planning and discussion phases prior to the actual production of the German language artefacts. The translanguaging space that emerged in this way clearly supported both comprehension and confidence. It also embodied the principle of inclusion that is so central to multicultural education research (that the learners' cultural backgrounds should be seen as assets). In the language classroom this can be a powerful way of reducing the hierarchy that often exists between the target language and the learners' home languages.

A number of caveats should be mentioned. Firstly, the study used intact classes rather than random assignment so

selection effects cannot be ruled out. Secondly, the intervention was delivered by a very small team of teachers and so teacher enthusiasm or teacher familiarity with the technology may have played a part. Thirdly, the 12 week duration of the intervention may not have been sufficient to capture any long term retention. Fourthly, the measures of strategy use and engagement were all self report and so are susceptible to social desirability bias. Finally, the study was at the university level with German as a foreign language; the results may well be different in a secondary context, in less resourced settings or with other target languages.

Future research should look at the model over longer time periods, across different proficiency levels and in different educational contexts. Experimental or cluster randomised designs would be ideal to strengthen the causal claims. Research should also look at which types of literary texts and which types of digital tasks are most effective for different language skills. Teacher education research should also look at how language teachers can be prepared to incorporate strategy instruction, multimodal design and psychologically informed practice without any increase in workload or any diminution of the linguistic content.

6. Conclusion

This study shows that a transdisciplinary approach to foreign language teaching can lead to improvements in strategy use, language performance, engagement and emotional well-being. The approach combines explicit instruction in language learning strategies with literature-based, multimodal digital production and educational psychodynamics to create a classroom environment in which students have both the tools and the confidence to learn. It's a model which is very much of relevance to language teachers who would like to link language learning with the arts, literature, culture and digital communication.

The practical takeaway is that digital tools should be enabling of meaning, strategies should be enabling of autonomy and psychological safety should be enabling of participation. When those three things are in play, language learning becomes not just more effective but far more human.

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