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RESEARCH-ARTICLE

## Interdisciplinary Harmonies: A Story-Driven Course on AI and Music to Increase Interest in Computer Science

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# Interdisciplinary Harmonies: A Story-Driven Course on AI and Music to Increase Interest in Computer Science

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## Abstract

To engage a broader spectrum of computer science (CS) students, particularly underrepresented groups such as novices and female students, this study introduces a unique interdisciplinary online course. This course merges the technical rigour of artificial intelligence (AI) with the aesthetic allure of music, underscoring the importance of beauty and arts in technology. It demonstrates AI's applications in music through song recommendation algorithms and composition generation, captivating students and enhancing their interest in CS. Findings from a pre-test-post-test survey study involving two school classes (24 students, female: 17, male: 7, mean age: 17.63) indicate a significant rise in students' engagement for CS with large effect sizes observed. These results highlight the potential of integrating arts into technology education, not only as an aesthetic enhancement but as a means to broaden the appeal and understanding of CS. This approach aligns with the growing emphasis on STEAM (Science, Technology, Engineering, Arts, Mathematics) education, aiming to make CS more accessible and prepare students for the diverse demands of the 21st-century workplace.

## CCS Concepts

• **Applied computing** → **E-learning**; • **Social and professional topics** → **User characteristics**.

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## Keywords

Interdisciplinary curriculum, interest, e-learning, STEAM, music, artificial intelligence, storytelling

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## 1 Introduction

In the dynamic landscape of the 21st-century workforce, computer science (CS) emerges as a pivotal field, offering essential skills and expertise in high demand. Recognizing the significance of fostering a new generation of CS professionals, there is a continuous endeavour to recruit and motivate students to pursue careers and studies in STEM-related subjects. One promising avenue for achieving this goal involves the incorporation of interdisciplinary aspects into CS education, establishing connections to students' everyday lives and applications that hold personal significance.

Early advocates of this approach, Cooper and Cunningham, emphasized framing CS as “the field of computing” rather than a standalone discipline. Their insight, underscoring the importance of contextualization in CS education, serves as a cornerstone for fostering student engagement and comprehension [16, p. 8]. The aspiration is not merely to engage a broader student demographic but also to address the persistent underrepresentation of certain groups in CS, offering an approach that diverges from traditional teaching methods. Acknowledging the importance of creativity as a central 21st-century skill, a recent paradigm shift involves the integration of arts into STEM, giving rise to STEAM (Science, Technology, Engineering, Arts, Mathematics) education, and providing new possibilities to resonate with students' interests.

Beauty and wonder, often associated with art and music, deserve recognition in the realm of technology. This integration is not just

aesthetic but functional, rekindling the innate sense of wonder we experienced in childhood. For programmers and technologists, engaging with beauty through art can reawaken a child-like perception of the world, translating the mundane into something extraordinary. This concept extends beyond mere appreciation of art; it's about retaining our ability to see the world with fresh eyes, full of awe and mystery. Art, in its many forms, captures this essence, presenting it to those who might have lost touch with this sense of wonder. By regularly interacting with art, individuals in the tech industry can reconnect with this perspective, enriching their professional and personal lives. In essence, making room for beauty in technology isn't just about aesthetics; it's about maintaining a connection to the profound mystery and wonder of life, which fuels innovation, creativity, and a deeper understanding of our world.

Our paper presents a case study of an innovative digital course that intertwines the arts into STEM. In the design of the course, we address previous research highlighting the opportunities of artificial intelligence (AI) in diversifying CS education [4, 33] and the growing demands on educators to equip students with complementing skills necessary for an AI-driven future [3]. Focusing on the fundamental principles of AI within the realm of music, this course aims to engage secondary school students in CS. The guiding research question is:

**RQ:** How can our interdisciplinary course about AI in the context of music positively impact students' perception and attitude toward CS?

## 2 Related Work

Interdisciplinary education has gained increasing attention as a means to enhance engagement and inclusivity in computer science (CS) education [5, 17, 37, 40, 44, 49]. Lin and Van Brummelen highlight the potential of embedding AI into other core subjects (e.g., English, and social studies) to make AI more accessible and to reach students outside of CS and technology classrooms [33].

It is well known that students have different demands on learning contexts to unfold their potential and to feel engaged [8, 27, 55]. For example, recent research identifies girls' preference for narrative learning approaches, aligning with the *dramatist* learning style [6]. Also, previous studies [12, 22] indicate that women and programming-inexperienced students tended to prefer *people*-related activities over *things*-related activities. Especially in terms of gender, there is much evidence that girls do prefer real-world inquiry-based open-ended learning approaches with social impact [10, 25]. A study by Alvarez et al. for example indicated a positive increase in girls' confidence and self-efficacy as they participated in a summer camp with a socially relevant AI curriculum [4]. Strengthening self-efficacy and challenging stereotypes is pivotal for sparking enthusiasm and fostering interest in CS [7, 25].

The evolution from STEM to STEAM (Science, Technology, Engineering, Arts, and Mathematics) underscores the acknowledgment of arts as integral to education [1, 28, 35]. Arts participation not only fosters creativity but also enhances problem-solving skills [41]. Arts education's role in developing soft skills, such as reflective capacity, creativity, and visual-spatial abilities, is well-established [32, 56]. As highlighted by Conradt and Bogner, STEAM environments are a promising starting point for research into promoting motivation

and creativity in educational settings [15]. Leveraging the synergies between arts and science subjects is crucial for nurturing these sought-after skills in students. This interdisciplinary approach recognizes the value of creative thinking for innovation, aligning with the demands of the 21st-century workplace. Furthermore, integrating arts into STEM provides new dimensions of possibilities for CS education, allowing for the inclusion of more *people*-related aspects and real-world examples that are relevant to students.

Bridging the realms of arts and technology, music presents unique opportunities to leverage the benefits of STEAM education. Its direct connections to students' everyday lives, especially in its *people*-related aspects, offer a distinctive avenue for enhancing engagement and interest in CS education [4]. While various papers explore teaching CS through music [45, 46], there is a gap in understanding the impact of such initiatives on students' interest and engagement in CS. Research on initiatives like *CodeBeats* and *EarSketch* suggest high potential of using coding for music generation to increase engagement for CS [21, 30, 34], but in contrast to our approach, those studies focus on using code for generating sounds.

In this paper, we present a novel digital course that integrates CS education with music, offering students an experiential journey into basic AI principles and their application in music generation. Our course design employs a narrative approach tailored to the learning style of "dramatists," complemented by in-depth knowledge and hands-on experiments for more "patterner"-oriented students. This approach fills a gap in the literature, providing a unique and engaging strategy for teaching AI through its applications in the realm of music.

## 3 Research Method

This paper presents insights derived from a classroom intervention involving secondary school students enrolled in an interdisciplinary digital course. The primary objective was to enhance students' interest in CS by imparting fundamental principles of artificial intelligence (AI) within the context of music. The digital course is available online ([rockstartit.com](http://rockstartit.com)).

To assess the effectiveness of our interdisciplinary course in influencing students' perception and interest in CS, we adopted an experimental pre-test-post-test study design [18]. Therefore, students were asked to complete a survey at the beginning and end. The course duration was about one hour.

### 3.1 Course Design

Besides the general focus on interdisciplinarity, the course contents were designed with an emphasis on *storytelling* while following certain *design principles* for *multimedia learning*, as described in [39]. A primary objective during the creation of the course was to embed the course contents in a story that should promote the ability to focus by immersion while making the contents more memorable. Experiencing a story can be a powerful part of every learning experience, in order to convey relevance and meaning, depending on the topic. A story linking learning contents generally improves the ability to remember respective contents — even in the long-term [9, 26].

The story itself was kept simple, so as not to distract from the course contents and revolves around the protagonist (*learning agent*) Lilli – a little girl who is about to form a band with her friends (see Figure 1). Unfortunately, no one among them can play the piano, so Lilli sets out to teach an AI how to play the piano herself. At the beginning of her journey, she gets insights into current applications of AI in music, such as text-to-music transformation or song and artist suggestions based on similarities. Later in the journey, she revisits the fundamentals of music at the local music school and learns about the basics of AI/ML during a lecture at the university (see Figure 2). Finally, she eventually meets a friend, who helps her to *code* her own piano AI, before she finally reflects on her journey.

The *creation* of the AI was imitated by a prepared script running in *Google Colab* to provide a realistic impression of what the actual work with AI/ML may look like. The script comprised a rudimentary version of a *transformer architecture* [52] learning from sound samples, proving interactive sections that the participants could manipulate to alter the generated composition. The story was illustrated by images generated with *Midjourney* (midjourney.com). Course contents were supplemented through the possibilities of interactive activities, such as quizzes.

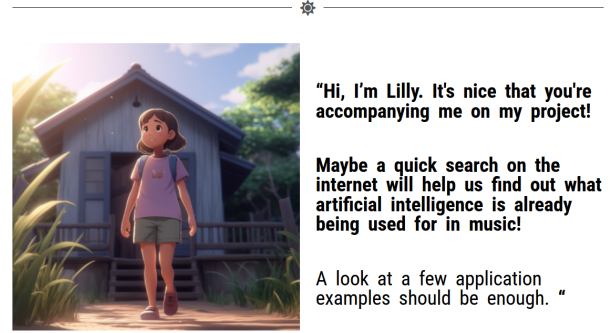
The course was designed under consideration of the theoretical concept of *cognitive load* [48] which states that learning is always accompanied by a degree of cognitive stress imposed by the learning procedure. The *12 principles of multimedia learning* as listed in [39] combine concepts that seek to reduce cognitive load, particularly in the context of *e-learning*. Although the descriptions of respective principles are out of the scope of this work, they provide useful guidelines for designing online courses.

### 3.2 Participants

The study was conducted in the context of regular school lessons where two different school classes of the same school participated. One of the researchers involved in the study is also a teacher for these classes, conducting the study firsthand. A total of 24 students (female: 17, male: 7) participated in the study, comprising 8 students in an 11th-grade class (female: 5, male: 3) and 16 students in a 12th-grade class (female: 12, male: 4). The students' ages ranged from 15 to 20 years, with a mean age of 17.63 and a median of 18 years.

These students attend a vocational school in the German state of Baden-Württemberg, specializing in social and health sciences. This school offers a 3-year high school program (11th, 12th, and 13th grade) leading to the *Abitur* qualifying them for higher education. Typically, students at this type of secondary school completed their prior education at a different type of secondary school, often the *Realschule*, which is ranked below the *Gymnasium* in the German school system, finishing at grade 10, or they switched from regular *Gymnasium* after grade 10 for the specialized focus of this type of school.

All participants were informed about their rights to participate in the survey study and provided written consent. Participation in the survey was voluntary.



Let's get a feel for what artificial intelligence can already achieve in music

today!

Together we will take a look at possible application examples.



#### 1 musical composition

Among other things, artificial intelligence is now used for the completely automated creation of instrumental interludes or even entire pieces of music! Luckily - otherwise we wouldn't have a chance to create our niano AI

**Figure 1: Screenshot from the course with the protagonist Lilli. Images like this were recursively generated by Midjourney reusing resulting images and style-defining keywords with a fixed random seed to keep created imagery consistent throughout the course. Translation from German.**

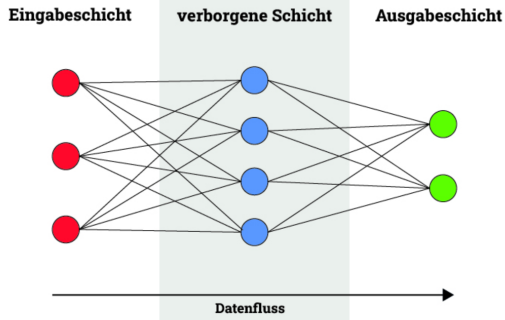
### 3.3 Survey

To assess the potential impact of our course on students' interest, we employed a questionnaire utilized in a similar study by Marquardt et al. [38, p. 133]. This instrument, tailored for pre-test-post-test studies, comprises a total of 28 items, with 18 items identically repeated in both the pre-test and post-test, and an additional 10 items specifically addressing activities in the course, administered only in the post-test. The questionnaire design focuses on evaluating enthusiasm potential through cognitive constructs, including *interest*, *positive feelings*, and *future intents*, derived from the person-object theory of interest (POI) [29]. Responses to multiple related items are aggregated to measure these dimensions. The majority of the questionnaire items utilize a Likert scale, ranging from "Strongly disagree (1)" to "Strongly agree (5)".

In addition to assessing interest-related constructs, the questionnaire incorporates items pertaining to students' perceptions, encompassing aspects such as *self-efficacy* and *stereotype bias*. As an extension, this study introduced three supplementary items

**Artificial neural networks**

In contrast to our natural neural network, the artificial neural network is divided into layers. It consists of at least three layers. An input layer, at least one hidden layer and an output layer. Like the human brain, the layers consist of individual neurons that are connected to each other across all layers.



**Why deep learning?**  
 The "depth" refers to the number of hidden layers. The more layers, the "deeper" the neural network is. The deeper the network can learn, the more complex things it can learn.

The input data is passed to the **input layer**. Computations are carried out in the **hidden layer**. There can also be several hidden layers lined up one after the other. The results of the calculations are output in the **output layer**.

**Figure 2: Screenshot from the course demonstrating the introduction to the theory of neural networks which is later in the course used to train a model to generate a piano piece. Translated from German.**

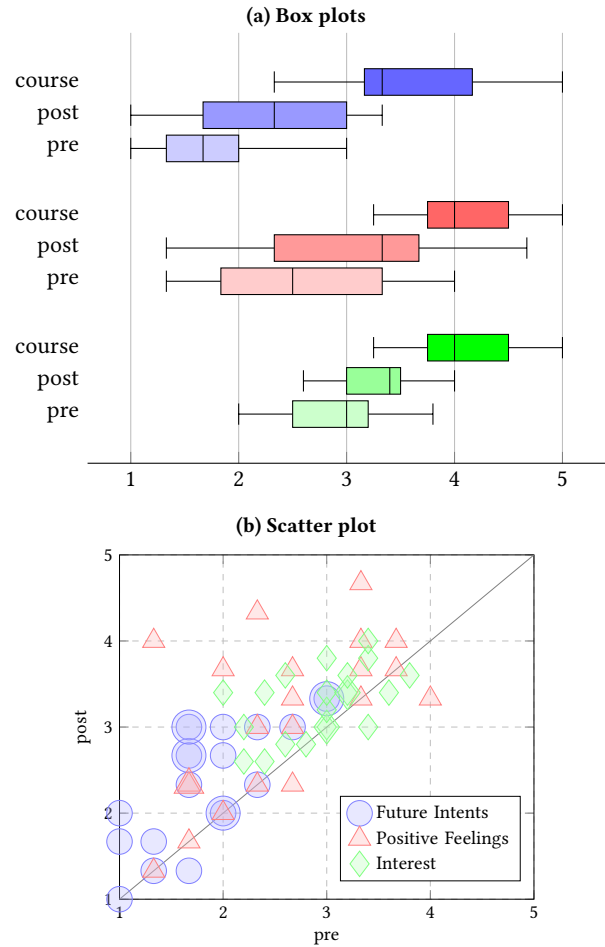
concerning students' perceptions of AI (see Figure 5). Sociodemographic data, including gender (options: "female", "male", "not listed"), age, and grade level, were also collected.

**3.4 Analysis**

Our analysis commenced with an exploratory phase employing descriptive statistics, including means (M) and effect sizes, to assess the potential impact of our approach [23]. Subsequently, we conducted paired t-test analyses, employing 95% confidence intervals (CIs) and Cohen's d for effect sizes, to compare pre-test and post-test results (within-subject analysis) [14, 24, 31]. In instances where Lvene's test for equality of variances performed at  $p < .05$ , indicating unequal variances, we opted for the Wilcoxon-Mann-Whitney test [20], reporting the test statistics (z) and the rank biserial correlation coefficient for the effect size ( $R^2$ ).

**4 Findings**

In this section we present findings from our analysis regarding our research question "How can our interdisciplinary course about AI in the context of music positively impact students' perception and attitude toward CS?". First, we will present how the attitude (future intents, positive feelings, interest) towards CS changed, as students participated in the course. Then we will have a closer look at students' feelings directly related to activities in the course.



**Figure 3: Box plots (3a) and scatter plot (3b) for three dimensions of interest: blue - future intents, red - positive feelings, green - interest. Values for each dimension are calculated by responses to multiple survey items on a Likert Scale from "Strongly disagree (1)" to "Strongly agree (5)".**

Third, results related to the general perception of CS, including stereotypes, as well as perception of AI are outlined.

**4.1 Impact on Attitude towards CS**

The initial general interest CS was relatively low, as indicated by the pre-test mean values presented in Table 1, and the box plots for the pre-test results (see Figure 3a). The notably low mean value of 1.85 for future intents, along with its corresponding box plot, reveals that students' inclination to engage with CS-related topics was minimal in the beginning. Similar trends were observed across the other two dimensions of positive feelings and interest.

However, the course markedly enhanced students' attitudes towards CS regarding the three dimensions of interest. This is particularly evident in the scatter plot (see Figure 3b), where each survey response is plotted according to its pre-test (x-axis) and post-test (y-axis) values for each dimension of interest. Therefore,

**Table 1: Paired samples t-test results for post-test to pre-test comparison of interest dimensions**

Dimension	n	Mean (M)		SD		Mean diff.	95%-CI		Test statistics			Cohen's d	95%-CI		Power
		pre	post	pre	post		Lower	Upper	t	df	p		Lower	Upper	
Future Intents	20	1.85	2.37	0.60	0.71	0.52	0.29	0.75	4.72	19.0	<.001	1.06	0.50	1.60	0.99
Positive Feelings	21	2.57	3.14	0.81	0.91	0.57	0.21	0.94	3.26	20.0	.004	0.71	0.22	1.18	0.85
Interest	21	2.92	3.28	0.49	0.40	0.35	0.15	0.56	3.58	20.0	.002	0.78	0.28	1.26	0.91

each marker positioned above the diagonal in the scatter plot indicates a positive shift in one of the three dimensions of interest for an individual student. The placement of nearly all markers above the diagonal line indicates a positive shift in individual students' interest dimensions. This substantial increase in CS engagement across all dimensions is corroborated by the shifts in the box plots (see Figure 3a) and the outcomes from the t-tests (see Table 1). For each dimension of interest, the course had a statistically significant influence, with large effect sizes observed.

**Future Intents.** The most pronounced impact was on the dimension of future intents, evidenced by a large effect size of  $d=1.06$  ( $p<.001$ ). This is especially highlighted by the students' attitude change towards the survey items "I would be interested in learning more about CS than I need for school" with a median change from "Rather disagree (2)" to "Neutral (3)" ( $z=5.00$ ,  $R^2=0.87$ ,  $p=.006$ ) and "I can see myself doing something in the field of CS later on after school" with a median change from "Strongly disagree (1)" to "Rather disagree (2)" ( $z=0.00$ ,  $R^2=1.00$ ,  $p=.018$ ).

**Positive Feelings.** Positive feelings towards CS also greatly increased with a medium to large effect size of  $d=0.71$  ( $p=.004$ ). Participating students indicated highly increased enjoyment of using computers to solve problems and curiosity about the applications of computers. The increase of students' positive feelings toward CS is especially reflected by the survey items "I enjoy solving problems with computers" by a median change from "Rather disagree (2)" to "Rather agree (4)" ( $z=4.50$ ,  $R^2=0.89$ ,  $p=.006$ ) and "Learning about what computers can do is fun" by a median change from "Neutral (3)" to "Rather agree (4)" ( $z=9.00$ ,  $R^2=0.77$ ,  $p=.017$ ).

**Interest.** Students' general interest in CS was also positively impacted by the course with a medium to large effect size of  $d=0.78$  ( $p=.002$ ). This is particularly highlighted by the median change from "Rather disagree (2)" to "Neutral (3)" of the item "I am interested in CS" ( $z=8.00$ ,  $R^2=0.64$ ,  $p=.080$ ). Also, the image of the working field of computer scientists was positively affected as reflected by the item "Computer scientist deal with interesting topics" with a positive change from a mean value of  $M=2.96$  in the pre-test to  $M=3.52$  in the post-test ( $z=4.50$ ,  $R^2=0.84$ ,  $p=.015$ ) and by the item "Computing jobs are boring" with a positive change from a mean value of  $M=3.29$  in the pre-test to  $M=2.86$  in the post-test ( $z=84.00$ ,  $R^2=0.60$ ,  $p=.032$ ).

**OBSERVATION 1:** The interdisciplinary course had statistically significant impacts on students' future intents, positive feelings, and interest toward CS with medium to large effect sizes.

## 4.2 Course Experience

The results regarding attitude changes of students align with their feelings related to the activities in the course. Overall the course was very well received by the students as the box plots for the category *course* in Figure 3a illustrate.

**Future Intents.** Despite the very low interest of students in future activities related to CS in the pre-test they showed rather positive intentions of engaging with a similar course again as indicated by the item "I would love to do a course like this again" ( $M=3.62$ ,  $SD=0.97$ ). Additionally, nearly 50% of students ( $n=10$ ) responded with "Rather agree (4)" ( $n=8$ ) or "Strongly agree (5)" ( $n=2$ ) to the item "I have/will talk to friends, parents, or siblings about things I experienced in the course" ( $M=3.24$ ,  $SD=1.14$ , see Figure 4a), possibly reflecting the novelty of the course topics, as indicated by the item "During the course I had an aha moment" ( $M=4.05$ ,  $SD=1.02$ ).

**Positive Feelings.** Students showed very positive feelings related to the activities in the course ( $M=4.09$ ,  $SD=0.74$ ). The results show that they enjoyed engaging with the topics as indicated by the median of "Rather agree (4)" at the survey item "It was fun to engage with the topics covered in the course" ( $M=4.33$ ,  $SD=0.66$ , see Figure 4b). Furthermore, students expressed a unanimous desire for more courses like this in school, with over 90% of participants voting for "Rather agree (4)" ( $n=6$ ) or "Strongly Agree (5)" ( $n=13$ ) on the item "School would be more fun if we would cover things like this more often" ( $M=4.43$ ,  $SD=0.98$ , see Figure 4c).

**Interest.** The topics of the course seem to have high relevance for the students as indicated by the item "I felt like I had learned something for myself" ( $M=4.24$ ,  $SD=0.70$ , see Figure 4d). Additionally, a considerable number of students expressed their willingness to recommend the course to others, as indicated by the item "I would recommend such a course to others" ( $M=4.19$ ,  $SD=0.68$ ).

**OBSERVATION 2:** The interdisciplinary course was particularly well received by students, as they exhibited high levels of positive feelings related to activities in the course and an increased perceived relevance of the topics covered.

## 4.3 Impact on Perception of AI and CS

The outcomes from AI-related survey items reveal that students initially recognized AI as a significant trend and possessed a basic understanding of its applications (see Figure 5). The findings further suggest that the course not only sustains this perception but also positively augments it. This is highlighted by the significant shift in responses to the survey item "I have a rough idea of how artificial intelligence works" from a mean response value of  $M=2.95$  in the pre-test to  $M=3.90$  in the post-test ( $z=3.50$ ,  $R^2=0.91$ ,  $p=.005$ ).

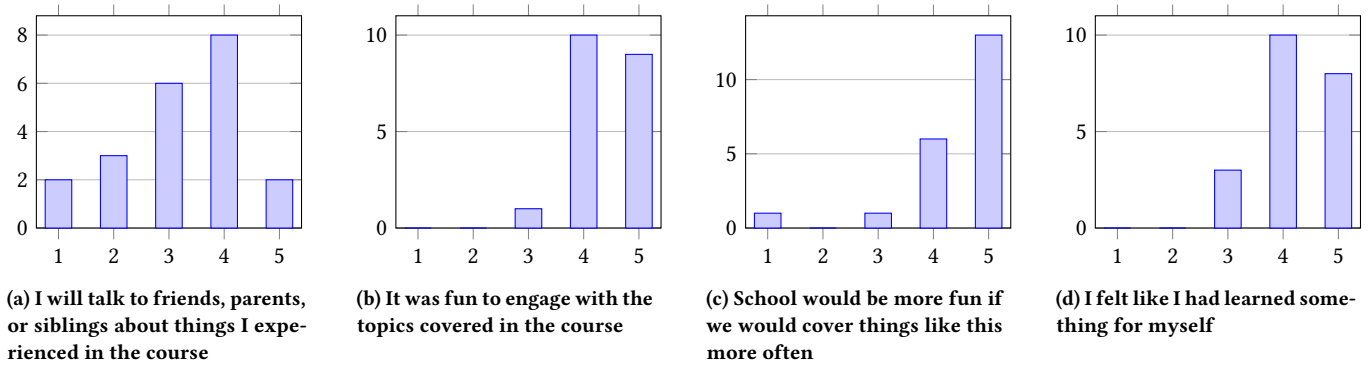


Figure 4: Frequency distribution for selected items related to experiences in the course in the post-test

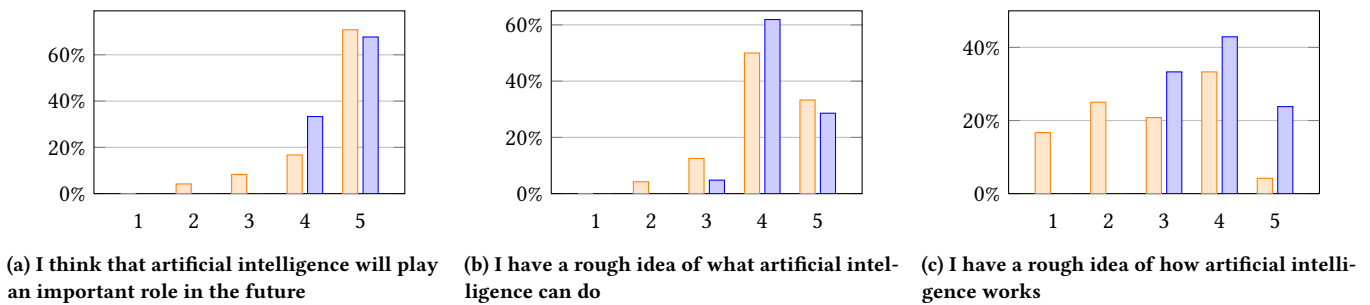


Figure 5: Frequency distribution in pre-test (orange, N=24) and post-test (blue, N=21) for AI-related survey items.

The observed alteration in median responses to the survey item, “Computer science is... rather a very specialized field or just everywhere?” from a median of “Neutral (3)” in the pre-test to “Rather everywhere (4)” in the post-test ( $z=4.00$ ,  $R^2=0.82$ ,  $p=.025$ ) further highlight the course’s efficacy in expanding students’ perceptions of the field of CS. This shift is indicative of an enhanced understanding among students, regarding the ubiquitous nature and broad applicability of CS, as opposed to perceiving it as a narrowly focused discipline. These results underscore the course’s effectiveness in deepening students’ comprehension of AI and bolstering their appreciation for the subject matter.

We did not observe a stereotype bias among the students as the high pre-test ( $M=4.46$ ,  $SD=0.88$ ) and post-test ( $M=4.52$ ,  $SD=0.68$ ) values of the item “CS is an appropriate subject for both boys and girls” indicate.

**OBSERVATION 3:** Students did consider AI as an important trend already in the beginning. Throughout the interdisciplinary course students’ perception of CS shifted to a broader view of applications.

## 5 Discussion

Our findings contribute to the burgeoning field of interdisciplinary STEAM education, shedding light on the effectiveness of our course in the context of CS and music. Building upon previous studies [e.g. 5, 25, 40, 44, 49], our results affirm the value of interdisciplinary education in fostering interest and engagement in CS while addressing diversity concerns in CS education.

The positive reception of our course was evident in students’ expressions of high positive feelings towards activities in the course and their appreciation for the course’s relevance. Furthermore, our study revealed a significant increase in students’ interest, positive feelings, and future intentions in CS with medium to large effect sizes.

While subjective, students reported a higher understanding of AI, aligning with prior research suggesting that interdisciplinary teaching can be effective in increasing understanding and performance [16, 53]. Regardless of the actual improvement in understanding, the perceived increase in understanding is an important step in the direction of also increasing their self-efficacy. Strengthening self-efficacy is an important setscrew to make students feel more comfortable and confident in the field of CS which in turn is relevant to developing interest [2, 50].

Our results suggest a resonance of the intertwined topics of AI and music with students’ interests and learning styles, corroborating findings from initiatives such as *CodeBeats* and *EarSketch* [21, 34]. The course not only succeeded in amplifying interest in CS but also notably expanded students’ perceptions of CS, evolving it from a more specialized field into a broader application area. Concurrently, our study unveiled a heightened recognition of the significance of AI among students. This illustrates how a curriculum integrating topics relevant to students’ everyday lives, such as AI, and those personally resonant, like music, can effectively elevate their engagement with the subject matter, or, to frame it as

Freeman et al. from *EarSketch*: such a program “[...] that emphasizes dual-domain authenticity [...] offers a pathway for students to enjoy computing, to find it fun and engaging, and to want to pursue it simply because they love it.” [21, p.85].

This aligns with other studies that have shown the benefits of learning environments that embed topics into a broader context and involve creative and problem-solving skills, particularly for underrepresented groups in STEM [17, 42, 51]. Given that the majority of our study group was female, our results support previous research highlighting the effectiveness of interdisciplinary courses in engaging diverse audiences, particularly female students and those initially less interested in CS [17, 38, 40]. Also, does our study indicate, that a storytelling approach can be beneficial in supporting students’ engagement as highlighted by Manzano et al.: “[...] when students [...] have tasks that they consider significant wrapped in a pleasant narrative for them, they can have greater motivation towards the task and reinforce desirable study habits” [36, p. 10].

Considering the students’ school background with a social/health-science focus and their relatively low initial interest in CS, it is remarkable how well our interdisciplinary course was received by the students and how positively it influenced their perceptions of CS. Although a complete shift in their career trajectory may not be expected, our efforts underscore the importance of periodically offering students opportunities to cultivate situational interest by connecting with their personal interests. Frequent exposure to such experiences can lead to the development of sustained individual interest [43].

This highlights the need for more studies like ours investigating the effect of different topics and teaching methods to gain a better understanding of how interdisciplinary education can be utilized for CS education.

**RECOMMENDATION:** Incorporating more interdisciplinary topics, aligned with students’ everyday experiences and personal interests, holds great promise in expanding engagement in CS classes.

## 6 Threats to Validity

As with every empirical research our study comprises several limitations that are important to consider when interpreting our findings. In the following, we highlight such threats to validity in the context of our study.

Firstly, we acknowledge the threats arising from the modest sample size, comprising two school classes totaling 24 students, due to the limited availability of school classes for our study time frame. Despite the undeniable impact of our course in increasing the interest of students in our current sample, with nearly every participant reporting increased enthusiasm for computer science (CS), the small sample size necessitates cautious interpretation regarding generalizability. For this purpose, we performed a post-hoc analysis with the G\*Power tool [19] to estimate the statistical power of our findings [13]. The power analysis tells us the probability of not committing a type II error, or in other words: it is the probability of detecting an effect if there is one [11]. A common threshold for statistical power is 0.8. For the three dimensions of interest investigated the following power values are observed: 0.99 for future intents, 0.85 for positive feelings, and 0.91 for interest (for  $\alpha = .05$ ),

overall indicating a good chance of detecting an effect, if there is one.

Secondly, the subjective nature of survey responses introduces a potential source of bias influenced by individual perceptions and external factors. While Likert scales, in particular, may exhibit variations in perceived distances between ratings, they are validly used in (educational) research to measure effects [47].

Thirdly, it is crucial to acknowledge the presence of confounding variables that may have influenced our results besides the course itself, such as variations in teaching styles, classroom atmosphere, and other external factors. Despite these possible confounders, by the nature of our study design their impact was minimized. Students primarily engaged with the course material independently through an online platform, necessitating barely any direct interaction with peers or instructors. The course content was designed to be self-explanatory, minimizing the necessity for additional intervention from instructors. Nevertheless, we acknowledge that complete isolation from all external influences is impractical, and therefore, some degree of influence from these confounding variables cannot be entirely ruled out.

Lastly, as we did not have the resources to develop an even more comprehensive course and to conduct a long-term investigation, our findings have to be considered within the concept of *situational interest*, recognizing that our findings represent a snapshot in students’ interest development and that factors beyond the course content, such as novelty effects, could also have an impact student responses. Nevertheless, it is widely acknowledged, that situational interest is a pivotal precursor to fostering long-lasting individual interest by providing repeated stimuli of situational interest [43].

In conclusion, while our study provides valuable insights into the potential of interdisciplinary teaching combined with storytelling in CS education, especially in increasing future intents in the subject and broadening the picture of CS, the limitations underscore the need for more extensive research with diverse cohorts and settings to validate and generalize our results beyond the scope of this single case [54].

## 7 Conclusion

In this paper, we have shed light on the potential of an interdisciplinary, story-driven online course teaching basic principles about AI in the context of music to enhance student engagement and interest. The results indicate an improvement in students’ attitudes towards CS, as evidenced by the significant positive shifts in students’ future intents, positive feelings, and interest in CS with large effect sizes observed. Thus, the contributions of this work include:

- A novel, story-driven online course that teaches AI principles in the context of music, ready to use by educators without further preparation necessary.
- Contributed empirical evidence to the growing body of research on strategies for engaging a broader audience in CS education as demonstrated by a significant, positive shift in students’ attitudes, highlighting the potential of interdisciplinary approaches to make CS more appealing and to reach a broader audience.

However, the study has some limitations, including its small sample size and the subjective nature of survey-based research.

While the findings are promising, they highlight the need for further research with larger and more diverse cohorts to establish the generalizability of these results. Future studies should also explore the long-term impact of such interdisciplinary approaches on students' sustained interest and their potential influence on career choices in STEM fields.

In conclusion, our findings reinforce the value of STEAM education in making CS more engaging and accessible. By intertwining subjects like music, closely related to students' personal experiences, we can render CS more appealing and inclusive. This strategy is not only crucial for diversifying the field but also for enriching CS education to reflect the diverse interests and backgrounds of students. The integration of arts and aesthetics, as shown in our study, is pivotal in this endeavor, offering a pathway to rekindle the sense of wonder and creativity in technology education.

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