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Issues and Perspectives

Effects of Videos With AI-Generated Images to Provide Students With Authentic and Diverse Insights Into STEM Occupations

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ABSTRACT

Societies worldwide face a shortage of STEM professionals, highlighting the need to increase student career interest, particularly among underrepresented groups. This article examines an extracurricular STEM intervention using elements of image-generating artificial intelligence (AI) in videos with auditory explanations to show STEM professionals work in a particularly diverse way. A quantitative pre-post survey with a control group ($n = 137$) showed no significant influence on STEM interest ($p = .374$), career-related STEM self-efficacy expectations ($p = .422$), career-related STEM outcome expectations ($p = .896$) and STEM career aspirations ($p = .780$). However, there were indications of a non-significant beneficial effect. Better video integration into the lesson context and a more diverse sample may lead to positive effects in the future.

Keywords: Artificial Intelligence, Career Orientation, Extracurricular Activities, STEM Education

INTRODUCTION

There is a global shortage of STEM professionals (Kennedy & Odell, 2023). For instance, highly developed countries such as Germany had around 418.200 vacant STEM positions in September 2024 and report increasing replacement needs of STEM professionals (Anger et al., 2024). However, this workforce is seen as a driving force for the sustainable economic development of societies (Peri et al., 2015). In the USA, "STEM workforce needs cannot be met without drawing the full potential of U.S. citizens" (Benish, 2018, p. 3). Hira (2022), for example, criticizes the narrative of a general STEM shortage in the USA while underscoring the relevance of "progress on diversity, equity, and inclusion" (Hira, 2022, p. 34) in this field. Despite varying definitions of what constitutes a STEM occupation, both Germany (Anger et al., 2024) and the USA (National Center for Science and Engineering Statistics, 2023) report below average representation of women in STEM occupations. While the proportion in Germany is around 16% (Anger et al., 2024), it is around 35% in the USA (National Center for Science and Engineering Statistics, 2023). Data presented by the National Center for Science and Engineering Statistics (2023) further shows that the overall societal distribution in terms of race, ethnicity, and disability is not accurately reflected in the STEM workforce, as workers are more often white (64%) and non-disabled (97%).

Regarding the shortages and underrepresentation of certain groups in STEM contexts, van Tuijl and van der Molen (2015) mention a lack of interest in STEM study fields and occupations as a problem. According to the Social Cognitive Career Theory (SCCT) by Lent et al. (1994), a lack of interest in a career can be favored by a lack of role models, with individuals identifying primarily with role models who are similar to them. The media can also convey role models (Kearney & Levine, 2020). The STEM field is particularly characterized by stereotypes, which are also influenced socially or by the media (van Tuijl & van der Molen, 2016). Stereotypical media presentations can prevent the formation of ideas about one´s own future and reduce the number of available role models for underrepresented groups like women (Corsbie-Massay & Wheatly, 2022). Luo et al. (2021) have empirically shown that stereotypical perceptions of STEM careers and professionals can inhibit career interests. Accordingly, reducing stereotypes should be pursued in combination with, among other things, increasing knowledge about the STEM field to increase students' interest in STEM occupations (van Tuijl & van der Molen, 2016).

The present study addresses these requirements by evaluating the use of videos with elements of image-generating AI to represent STEM occupations in a diverse and realistic way and reduce stereotypes.

LITERATURE REVIEW

Development of Career-Relevant Interests and Career Aspirations According to Social Cognitive Career Theory

Many theories describe the process of choosing a career (Mohr, 2022). According to Han et al. (2022), a useful approach for understanding the influence of individual and external factors on this process is the SCCT, according to Lent et al. (1994). The SCCT comprises five models that focus on interest development, decision-making, influences on and consequences of performance, the experience of well-being or satisfaction in educational and work contexts, and processes of career-related self-management (Lent, 2020). The SCCT builds on existing career choice theories, with Bandura's (1986) *Social Cognitive Theory* (SCT) forming the basis of the SCCT (Lent, 2020).

In the SCCT model of interest development, self-efficacy and outcome expectations, in particular, contribute to the development of career-relevant interests (Lent, 2020). According to Bandura (1986), self-efficacy beliefs are an assessment of one's ability to organize and carry out actions to achieve certain outcomes (Lent, 2020). Outcome expectations refer to individuals' beliefs that their personal values will be fulfilled by carrying out certain occupations or activities (Lent, 2020). In line with Bandura (1986), Lent et al. (1994) posit that self-efficacy influences outcome expectations as individuals tend to expect desired outcomes in specific activities if they feel efficacious in them. According to SCCT, people develop interest in precisely those areas in which they see themselves as competent and in which the performance of the activity leads to valued results - in other words, in which there are positive self-efficacy and outcome expectations (Lent, 2020).

According to the SCCT decision model, self-efficacy and outcome expectations, as well as career-related interests, significantly determine the development of career aspirations (Lent, 2020). Individuals tend to develop career aspirations for occupations harmonizing with their interests (Lent, 2020).

However, in terms of SCCT, the entire process of career choice is not "a single static event, but rather, […] part of a larger set of dynamic processes" (Lent, 2020, p. 138). Rather, before a career decision is made, goals and decisions that relate to participation in non-occupational activities are made (Lent, 2020). This leads to the performance-based revision of one's outcome expectations and self-efficacy, whereby career-relevant interests stabilize with age (Lent, 2020). Influences on career-relevant decisions and the development of interest can stem from the fact that self-efficacy and outcome expectations are shaped by social factors such as gender, ethnicity, and socio-economic status (Lent, 2020). For example, a lack of career-related role models could lead to stereotypical career aspirations and interests as well as limited experiences of self-efficacy (Lent, 2020). Bandura (1997) also states that vicarious experiences through role models can be a source of self-efficacy experiences.

Stereotypes and Lack of Knowledge as a Barrier to the Development of STEM Career Aspirations

The SCCT Lent (2020) emphasizes that students mostly identify with role models who share similarities, such as gender or ethnicity. Role models can also be conveyed through media (Kearney & Levine, 2020). According to Shimwell et al. (2021), it is particularly important in science to create opportunities for students to identify with scientists and thus demonstrate their role as possible future selves.

Therefore, it could be problematic if potential role models are portrayed stereotypically in the media as Luo et al. (2021) built on the SCCT, empirically investigated the relationship between STEM stereotypes, self-efficacy, and outcome expectations and showed that stereotypical perceptions of students could negatively influence their self-efficacy expectations about STEM activities, outcome expectations about entering a STEM occupation, and, mediated by the former constructs, STEM career interest. Corsbie-Massay and Wheatly (2022) refer to the case of gender stereotypes in the STEM sector and stress that stereotypes "affect girls and women directly by inhibiting the vision they have for their own lives, but […] can also cause peers, professors, and mentors to discourage girls and women from pursuing and advancing in STEM careers" (Corsbie-Massay & Wheatly, 2022, p. 4). In this context, already Gottfredson (1981) argued that if the occupational images someone has do not harmonize with the sense of their self, the corresponding occupation is discarded as a future possibility.

In a cross-disciplinary overview of research findings on STEM-related study choices and career development, van Tuijl and van der Molen (2016) state that the STEM sector, in particular, is affected by stereotypical perceptions, which are also conveyed through the media or socially. Referring to Gottfredson (1981), these relate to occupations in the STEM field and those who work in these occupations (van Tuijl & van der Molen, 2016). According to Ferguson and Lezotte (2020), Nassar-McMillan et al. (2011), and van Tuijl and van der Molen (2016), for example, typical STEM stereotypes could be that people working in STEM occupations are seen as male, belonging to the predominant ethnic group and lacking social skills.

Stereotypical ideas about STEM careers and professionals could negatively influence students' STEM career interests and should be replaced by realistic and more diverse ideas (Luo et al., 2021). For van Tuijl and van der Molen (2016), the first step to increase students' interest in STEM careers is to reduce stereotypes about STEM occupations and generate alternatives. In addition to this step, the authors identify increasing knowledge, ability beliefs, and the development of self-efficacy as important factors in achieving this goal (van Tuijl & van der Molen, 2016). Here, knowledge refers to the knowledge of children and adults about the STEM field, children regarding their own selves in STEM and parental and teacher knowledge about child development processes (van Tuijl & van der Molen, 2016).

Videos with AI-Generated Content as a Tool to Reduce Stereotypes and Increase Knowledge

As it is mentioned by van Tuijl and van der Molen (2016), the social environment and the media shape career-related ideas and stereotypes. In terms of the social environment, parents or other important adults, such as teachers, can influence children´s perceptions, with high-educated parents working in the STEM field increasing the likelihood of well-informed and low-stereotyped occupational images (van Tuijl & van der Molen, 2016). Television, as an example for media, can also influence "how children think about the *occupational* images they are exposed to" (Aladé et al., 2021, p. 341) and how individuals think about the world and themself (Aladé et al., 2021). Gender stereotypes occur in, for example, movies, advertising, or journalistic reporting and limit the possible visions of one's future possibilities as well as supportive behaviors of other people (Corsbie-Massay & Wheatly, 2022). On the other hand, children could authentically learn about occupations through television (Aladé et al., 2021). In particular, this could be an easy way to introduce children to role models and occupations (Aladé et al., 2021).

Stamer et al. (2021) have already shown that the exposure to videos is a way to use media and to give students a more realistic and diverse picture of scientific work. To this end, the authors used videos of structured scientific activities using the RIASEC+N model (Stamer et al., 2020). The RIASEC+N model, according to Dierks et al. (2014), is based on the RIASEC model initially developed by Holland (1997) to define different personality types and uses them, among other things, to categorize different work environments. However, the RIASEC+N model can categorize different facets of scientific work using the categories *Realistic*, *Investigative*/*Artistic*, *Social*, *Enterprising*, *Conventional*, and *Networking* (Dierks et al., 2014). This categorization can also be applied to activities across the entire STEM spectrum. Accordingly, the promising approach of Stamer et al. (2020) could also be adapted to reduce stereotypes of STEM occupations. At the same time, there are opportunities to continue developing the authors' video-based approach. Stamer et al. (2020) used self-produced film footage for their videos. One such video production can be limited by logistical constraints, such as financial, organizational, or technical challenges, which may prevent the representation of many interesting STEM facets.

AI-based tools that generate photorealistic images could overcome these limitations and offer more flexibility in visualizing STEM activities. One AI-based tool for user-requested image generation that already impacts art education is *Midjourney* (Chiu, 2023). Among other AIs, Midjourney or the OpenAI product *DALL-E 2* have gained popularity (Sun et al., 2024). Despite this, current studies in connection with the use of AI in career orientation tend to focus on the advisory function of these technologies, for example, in the form of career guidance by chatbots (e.g., Rajaraman et al., 2024; Shilaskar et al., 2024; Talib et al., 2023). To our best knowledge, no research has explored how image-generating AIs can support career orientation, particularly in teaching units that also focus on educating about occupations. Given AI's rapid development and diverse possibilities, exploring this potential seems crucial to evaluate the potential of generative AI for teaching in more depth. Specifically, practical applications of generative AI in career orientation should be demonstrated. This paper addresses this research gaps by presenting and evaluating the effectiveness of AI-generated images for educating about STEM occupations and further developing the video-based approach by Stamer et al. (2020).

Research Questions and Hypotheses

In order to increase interest in STEM occupations, a reduction of STEM-related stereotypes must be focused (van Tuijl & van der Molen, 2016). It was shown that these stereotypes can negatively impact the SCCT constructs (Luo et al., 2021). One way to present STEM occupations as more realistic and diversified is through videos structured according to the RIASEC+N model (Stamer et al., 2021). The use of image-generating AI could overcome previous barriers in creating such videos and further improve them. These assumptions lead to the following research questions.

To what extent does the use of videos about STEM occupations with content from image-generating AI influence the development of …

Q_1: ... students' self-efficacy expectations regarding the choice of a STEM occupation?
Q_2: ... students' outcome expectations regarding the choice of a STEM occupation?
Q_3: ... students' interest in STEM?
Q_4: ... students' STEM career aspirations?
Q_5: ... students' STEM stereotypes?

In science education, using videos without content from image-generating AI transformed occupational images into more diverse and realistic ones (Stamer et al., 2021). Such a change in occupational perceptions can impact self-efficacy and outcome expectations (Luo et al., 2021). According to SCCT, changes in these constructs are expected to affect students' career-relevant interests, i.e., their short- and long-term STEM interest, which may influence career aspirations and contribute to shifts in career aspirations (Lent, 2020). As the use of content from image-generating AI could diversify the visual dimensions of videos for career orientation, the following hypotheses are formulated about the research questions.

The use of videos about STEM occupations with content from image-generating AI influence the development of …

H_1: ... students' self-efficacy expectations regarding the choice of a STEM occupation.
H_2: ... students' outcome expectations regarding the choice of a STEM occupation.
H_3: ... students' interest in STEM.

H$_4$: ... students' STEM career aspirations.

RESEARCH METHOD

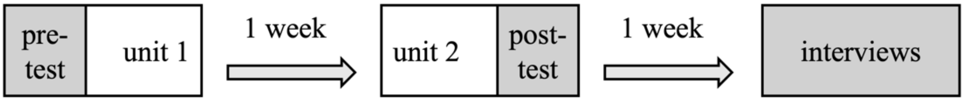
Study Design

A control group design was used to test the effects of the created videos. The experimental group consisted of five project courses that participated in two consecutive extracurricular workshops with videos. The control group also consisted of five courses and completed identical workshops without videos.

Each workshop unit, including surveys, lasted 90 minutes, with a one-week interval between sessions. Pretests were conducted before the first session's content introduction, and posttests followed the completion of the second session. Qualitative interviews were conducted one week after the second workshop and will be analyzed in a future publication (Fig. 1).

Figure 1

Temporal Sequence of the Intervention



Setting

Three videos were developed to present diverse, authentic impressions of STEM occupations using AI-generated images to examine the research questions. Each video highlights two to three categories of activities in STEM occupations structured along the RIASEC+N model. In the videos, the images illustrate those activities and are combined with voice-over explanations. Due to the wide range of STEM activities, the videos focus on occupations in public research institutions and private companies requiring a university degree. AI tools enabled the inclusion of activities challenging to film, such as paleontological excavations or automotive industry work (Fig. 2).

Figure 2

Screenshots of AI-Generated Images of Various STEM Professions

The videos range from 1:30 to 2:30 minutes and display the RIASEC+N activity area at the bottom. One video covers *Realistic*, *Investigative*, and *Conventional* dimensions, another focuses on *Artistic* and *Social* dimensions, and the third highlights *Networking* and *Enterprising* dimensions. The videos feature individuals of diverse genders, ethnicities, and appearances to challenge stereotypes about STEM occupations and people working in them, sometimes deliberately breaking stereotypes to increase identification potential.

Workshops with and without the created videos were held at Bielefeld University as part of the Kolumbus-Kids project. This project is an extracurricular student lab for scientifically gifted students (Peperkorn et al., 2022). The project's courses are independent of regular lessons and take place in the afternoon (Peperkorn et al., 2022). This form of gifted education is interlinked with the training of student teachers, who teach and design the project's workshop units (Wegner et al., 2013). Data was collected in two consecutive workshop units of the project.

In the workshop units, the students learned about the basics of programming and the Calliope mini. The Calliope mini is a microcontroller developed for the education sector and modeled on the micro:bit (Bockermann et al., 2018). It is characterized by its use not requiring the complex assembly of many individual parts (Bockermann et al., 2018). Many sensors and actuators, such as a temperature sensor or speakers, are already installed on the Calliope mini's star-shaped circuit board.

Both workshop units focused on group work with different task formats. In the first unit, the students were introduced to the operation and programming of the Calliope mini in a step-by-step and practice-orientated manner. For a low-barrier introduction, they learned block-based programming of the Calliope mini in the MakeCode programming interface rather than text-based programming.

In the second unit, students built on their prior knowledge by watching a video in which a zookeeper asked them for help in designing smart plant terrariums to reduce the zoo team's workload. Students explored additional sensors and actuators to create components for a terrarium that monitors soil moisture, light, and humidity. Faster groups could also design CO_2 and temperature monitoring systems, including cooling fans.

In the spirit of integrating the Kolumbus-Kids project into teacher training, all workshop units are conducted by teacher training students in Bachelor's or Master's programs, with each course being supervised by three to four students and a course leader with teaching experience.

Participants

A total of 171 children participated in the pretest and 169 children in the posttest. $n = 137$ ($n_{male} = 86$ (62.77%); $n_{female} = 50$ (36.50%); $n_{not\ specified} = 1$ (0.73%)) children took part in both the pretest and the posttest. Including the participants from both data collection points, the control group consisted of 73 children ($n_{male} = 42$ (57.53%), $n_{female} = 31$ (42.47%)), and the experimental group of 64 children ($n_{male} = 44$ (68.75%), $n_{female} = 19$ (29.69%), $n_{not\ specified} = 1$ (1.56%)). All children showed a giftedness for science. The participants' ages ranged from 7 to 12 years ($M = 9.78$). After confirming homogenous variances, a t-test revealed no significant age difference between the experimental ($M = 9.92$) and control group ($M = 9.66$) $t(135) = -1.604$, $p = .111$. A Welch-test, accounting for non-homogenous variances, showed no significant gender differences in the pretest, excluding one child who did not report gender $t(133.242) = 1.493$, $p = .138$. In the control group, 41 children reported having parents or grandparents born outside Germany, 31 did not, and one provided no information. In the experimental group, 40 reported such a migration background, and 24 did not. A t-test, conducted after Levene's test confirmed homogenous variances, indicated no significant difference between the groups for this characteristic in the pretest $t(134) = -.655$, $p = .514$, excluding one child that did not answer the question.

Data Collection Methods

A questionnaire was designed for data collection, collecting central components of the SCCT (Lent, 2020). Table 1 contains an overview of all the constructs and survey categories included in the questionnaire. With a few exceptions, students could answer all the questions on the questionnaire using a six-point Likert scale on tablets. In accordance with the subject-specificity and sometimes short-term nature of situational interest (Renninger & Hidi, 2016), the SIT was only obtained immediately after the second workshop unit and about the STEM content dealt with in this workshop unit.

Table 1

Overview of the Questionnaire Contents

Construct/ survey category	Example item	Number of items	Cronbachs -α
Situational interest in the content of the second workshop unit (SIT) [Translated and adapted according to Wegner, 2009]	I found the work in the workshop so exciting that I want to know more about this topic.	4	.755
STEM interest (INT) [Translated and adapted according to Wegner, 2009]	Dealing with STEM improves my mood.	6	.832-.869
Career-related STEM self-efficacy expectations (OSE) [Translated and adapted according to Mohr, 2022]	I am confident that I could work in a STEM profession.	4	.851-.852
Career-related STEM outcome expectations (OOE) [Own and adapted and reduced according to Luo et al., 2021]	If I work in a STEM profession, my parents will be proud.	7	.698-.747
STEM career aspirations (CA) [Translated and adapted according to Mohr, 2022]	I want to work in a STEM field later on.	4	.932-.939
STEM stereotypes (STE) [Own and adapted according to Luo et al., 2021 based on Garriott et al. 2017]	Ability to deal with other people.	10	

Gained knowledge about STEM occupations (GKS) [Own]	Did you learn anything new about STEM occupations during the last two workshop days?	1
Gained knowledge about people in STEM occupations (GKO) [Own]	Did you learn anything new about people who work in STEM occupations during the last two workshop days?	1
STEM career interest (SCI) [Own]	Did the last two workshop days to spark your interest in STEM occupations?	1
Source of new STEM career interest (SSI) [Own]	If so, what sparked your interest?	1

Note. Surveyed constructs and categories, including an example item, the number of items per construct/category, and Cronbach's alpha as a measure of internal consistency. The first reliability value is based on all completed questionnaires from the pretest, while the second is based on those from the posttest. The STE were measured on a seven-point scale, with each presented as a trait that students were asked to rate based on its prominence in a typical person in a STEM occupation (1 = low, 7 = high, 4 = average). For STE on gender and immigrant background, a 7 indicated an excess of women or people with an immigrant background. Due to this data collection method, no construct for STE is formed, and descriptive results are reported. Four items are included for free evaluation (GKS, GKO, SCI, SSI). SSI included the options *course instructors*, *station work*, or a self-formulated response. The experimental group also had *videos* as an answer option.

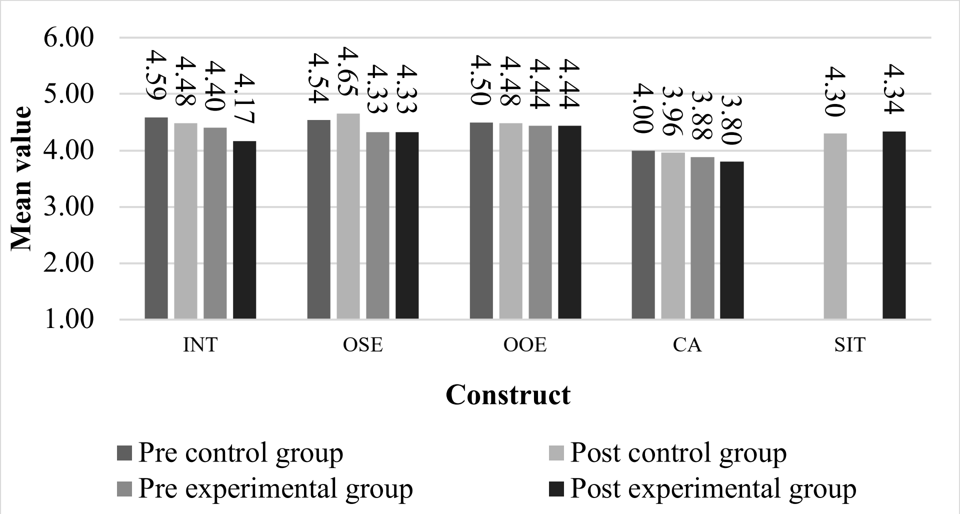
RESULTS

Mixed ANOVAs were conducted to examine differences in development over time between the experimental and control groups for the constructs in Table 1, excluding SIT. All participants who completed pre- and posttests were included ($n = 137$), except for one extreme outlier in the occupational outcome expectations construct ($n = 136$).
According to the Levene test, the error variances were homogeneous for all constructs ($p > .05$). In addition, the covariances were homogeneous according to the box tests (INT: $p = .446$; OSE: $p = .331$; OOE: $p = .097$; CA: $p = .989$). Regarding INT, there was no significant interaction effect between time and the two study groups, $F(1,135) = .80$, $p = .374$. There was also no interaction effect for OSE, $F(1,135) = .65$, $p = .422$, OOE, $F(1,134) = .02$, $p = .896$ and CA, $F(1,135) = .08$, $p = .780$. Only in relation to INT was a significant main effect for time, $F(1,135) = 6.70$, $p = .011$, partial $\eta^2 = .05$.

After the Levene test confirmed homogenous variances, a t-test ($n = 137$) showed no significant difference between the two groups in SIT, $t(135) = -.222$, $p = .825$. The descriptive results of the surveyed constructs are shown in figure 3.

Figure 3

Descriptive Results of the Surveyed Constructs

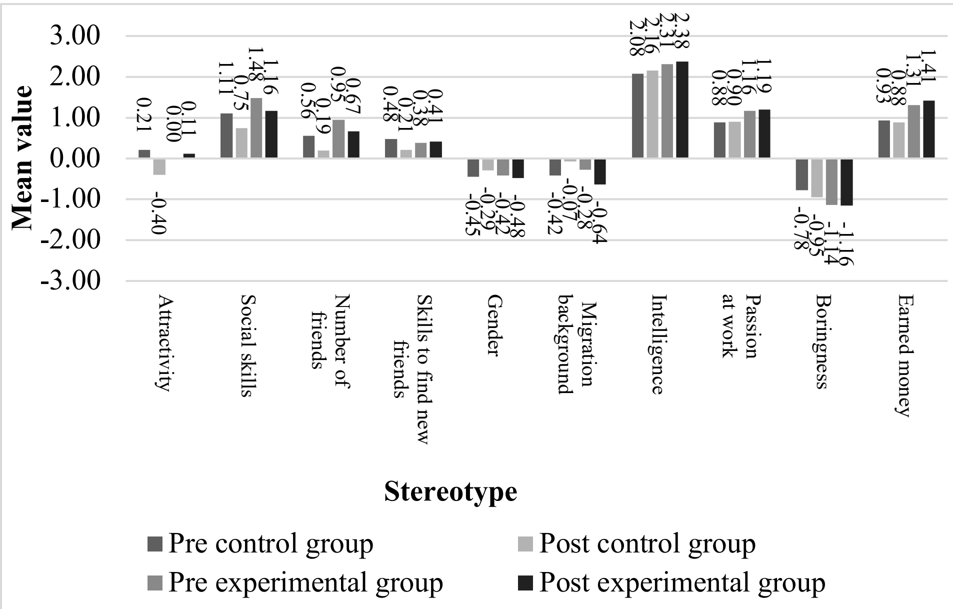


Note. Surveyed constructs include STEM interest (INT) with $n = 137$, Career-related STEM self-efficacy expectations (OSE) with $n = 137$, Career-related STEM outcome expectations (OOE) with $n = 136$, STEM career aspirations (CA) with $n = 137$, Situational interest in the content of the second workshop unit (SIT) with $n = 137$.

Figure 4 shows the descriptive values of the STEs surveyed. A value of zero represents a characteristic that is assessed as average, i.e., a four on the described scale of one to seven. A value of three represents a seven stated in the questionnaire, and a -3 a one stated in the questionnaire.

Figure 4

Descriptive Results of the Surveyed Stereotypes

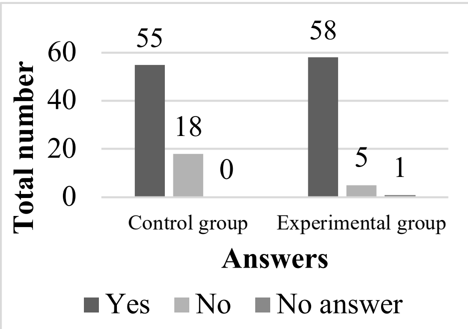


Note. Surveyed and abbreviated stereotypes in the sample ($n = 137$) are listed vertically below the data.

Regarding item GKS, 55 students in the control group answered *yes* and 18 *no*. In the experimental group, 58 students answered this question with *yes* and five with *no*. One person in the experimental group did not answer the question (Fig. 5). Regarding item GKO, 34 students in the control group answered *yes* and 39 answered *no*. In the experimental group, 45 students answered *yes*, 17 answered *no*, and two gave no answer (Fig. 6).

Figure 5

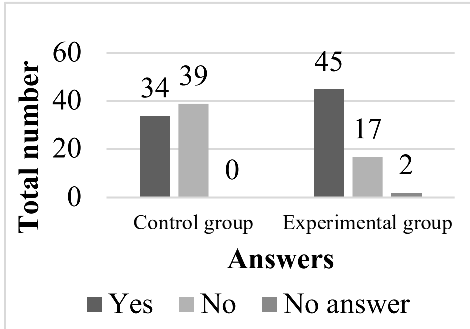
Student Responses on Whether They Gained Knowledge About People in STEM Occupations



Note. The sample size is *n* = 137.

Figure 6

Student Responses on Whether They Gained Knowledge About People in STEM Occupations



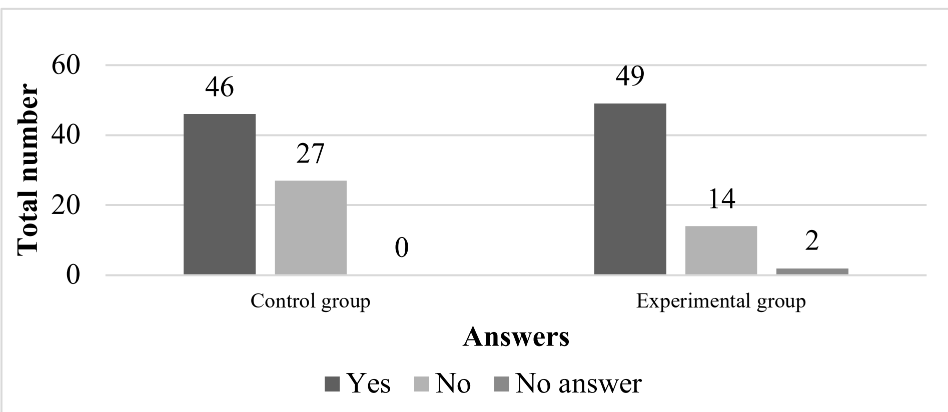
Note. The sample size is *n* = 137.

In the control group, 46 students affirmed item SCI, while 27 answered negatively. In the experimental group, 49 students answered the question in the affirmative, with 14 answering in the negative. In the experimental group, one person did not answer the question (Fig. 7).

Eleven students stated that the course instructors had aroused their interest concerning item SSI. Additionally, 33 control group children and 20 experimental group children ticked station work, while 19 experimental group children noted the videos as sources.

Figure 7

Student Responses on Whether the Workshop Days Sparked Their Interest in STEM Occupations



Note. The sample size is *n* = 137.

DISCUSSION AND CONCLUSIONS

Based on the results, all hypotheses must be rejected. No significant interaction effects became apparent in the course of the Mixed ANOVA. Accordingly, both the experimental and control groups did not develop significantly differently. Therefore, an effect of the use of video on the development of the constructs presented can be rejected.

A significant main effect for time was found in STEM interest, showing a decline across both groups, independent of group affiliation. Accordingly, it is reasonable to assume that the intervention reduced the students' interest in STEM, independent of the video use. According to the SCCT, self-efficacy, and outcome expectations influence the formation of interests. In the teaching units, it became apparent that all student groups struggled with the high difficulty and did not finish the tasks. Maybe the students interpreted this as a deficit in their abilities, resulting in a reduction in self-efficacy expectations and, subsequently, in their interest in STEM.

There could be several reasons for the similar development of the experimental and control group. Firstly, the sample consists of a special group of students, who are gifted in science and participated voluntarily in extracurricular courses. Their high pre-test scores may have limited its increase.

Furthermore, the videos could have not been integrated into the lesson context effectively enough. In Future work this could be realized by more detailed explanations of their use and a debriefing, leading to more conscious engagement with the videos. Explanations and debriefings could also address comprehension difficulties, which may have occurred in younger students but were not communicated.

Additionally, the students maybe couldn't identify with the people in the videos due to a significant age difference, which may have hindered their acceptance as potential role models.

Interestingly, more experimental group students reported increased knowledge of STEM occupations, of people who work in these occupations and increased interest in STEM occupations. This indicates that the videos could have only slight positive effects and, therefore, did not influence the constructs. Furthermore, interest in STEM occupations must be distinguished from STEM interest. Accordingly, it seems plausible that the use of video did not have any effect on students' interest in STEM, but that they reported an increased interest in STEM occupations. In general, however, the findings of the final questions in the questionnaire must be interpreted with caution and only serve as a guide.

Regarding stereotypes, positive changes were noted in two characteristics within the experimental group, but other stereotypes moved toward more extreme perceptions. The control group developed a more moderate perception of six stereotypes. This shows that using the videos did not make the students' stereotypical perceptions more moderate. However, it can be assumed that the students also perceived student teachers as STEM experts and modified their stereotypes based on their characteristics. For example, the children in the experimental group could have interacted with more instructors corresponding to certain stereotypes and thus prevented them becoming more moderate.

It also became apparent that many children had difficulties understanding the terms STEM and STEM occupations. For example, children mistakenly included occupations under this term that could not be categorized as STEM occupations or could only name a few specific occupations.

Subsequent surveys should take up the findings discussed and examine a modified use of the videos. For example, it seems sensible to integrate the videos more strongly into the lesson context and thematize them to reinforce any existing effects on the students. At the same time, it seems worthwhile to evaluate the use of videos in a more diverse sample that not only consists of children with a scientific giftedness. In addition, a way should be found to categorize STEM occupations more tangible for children.

IMPLICATIONS

Using videos with AI-generated images had no significant effect on the constructs surveyed. Descriptively, the videos led to fewer stereotypes becoming more moderate during the intervention. Additionally, more children in the experimental group reported learning something new about STEM occupations and people working in those fields. They also indicated a greater increase in interest in STEM careers. This could indicate that the videos certainly had a positive effect but were not sufficiently integrated into the context of the lessons and thus had no significant influence on students. Future use of videos should be more strongly integrated into the lesson context and discussed. Additionally, a more diverse student sample should be surveyed, and STEM occupations should be categorized as more tangible.

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