

Article

Measuring Students' School Motivation

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Abstract: Education is supposed to lay the foundation for vocational maturity. However, young people lose their motivation to learn at school instead. Adequate teaching concepts to promote school motivation need to be developed, but efficient tools to evaluate them at the level of school motivation are lacking. For this purpose, we built upon the established Science Motivation measure (SMOT) by reformulating items for a general school motivation scale (SchMOT) and applying it to 281 fifth graders. Since children are active creators and not consumers of knowledge, we consider learning motivation correlated with creativity, as demonstrated by the original motivation questionnaire. A principal component factor analysis with varimax rotation confirmed the hypothetical four-factor structure: self-efficacy, self-determination, intrinsic motivation and grade motivation. Factor loadings ranged from 0.556 to 0.746; cross-loadings never exceeded 0.4. The SEM model of motivation confirmed the factor structure with self-efficacy as the strongest predictor of motivation. The correlation of motivation and creativity revealed the particular importance of self-efficacy. This study has shown its appropriateness in measuring adolescent school motivation. Results emphasised the need for self-efficacy, both as an indicator of conducive teaching and an essential pedagogical goal. Suggestions for creativity-based teaching initiatives that promote school motivation by incorporating self-efficacy are discussed.

Keywords: motivation; school motivation; measurement; creativity; self-efficacy; education; adolescent; self-determination; grade motivation; creativity



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1. Introduction

Modern classrooms aim to educate mature citizens ready to deal with post-industrial culture's complex problems [1]. The latter requires an education that promotes self-responsibility and reflection [2].

Exceptional cognitive performance is needed to achieve these aspired skills for ongoing biological processes of assimilation and accommodation [3] to adapt appropriately to the environment [4]. Stimuli from the environment are required to activate these development processes, as in the development of cognitive creativity, as they are experienced in everyday life or can be consciously given by educators [4,5]. Kyllonen et al. investigated how motivation can be assessed and developed to increase students' readiness for college [6]. Their results revealed that motivation changes over time and that particular interventions have proven successful in changing distinct personality facets, leading to increased achievement. At present, most public institutions lack the appropriate support to promote these processes in a targeted manner, which could hinder cognitive and emotional maturation and raise many known problems of immature young adults in the current generation [7,8].

Maturity in this scope should be understood as the students' ability to act and plan independently [9]. A maturation process requires the adolescent's cognition to work at peak efficiency [9] to maximise learning skills and deal with the interrelationships between different elements in his or her life. These complex competencies only emerge when they are practised [9,10]. Maturity programs that promote self-knowledge as individuals' awareness

of themselves and their abilities [10,11] or self-responsibility and self-efficacy [11] have proven helpful.

Maturity, however, is a difficult concept to define and accordingly vague to measure [11–13]. There is evidence that maturity is related to self-efficacy [14] and related to self-responsibility and self-efficacy [11], which is in line with Maslow's motivation theory and personality [15]. Following Maslow's theory of motivation and personality [15], school motivation with self-efficacy could indicate later maturity. This led to the present study's research question to develop a questionnaire that measures school motivation as an indicator of maturity.

1.1. Measurement of School Motivation

An established quantitative measure for self-reported motivation is the SMOT scale by focusing on scientific motivation in classrooms [16]. Earlier versions were known under the acronym SMQ (science motivation questionnaire). The instrument application has shown a flexible setting when adapted in diction, language, direct project reference, and age level [17–19]. As science motivation measurement can build upon some tradition of studies, observing general school motivation is still an open issue [17,20,21]. Reformulating this instrument for a school level may offer a bridge for an appropriate measure for self-reported general school motivation. Since one task of the SMOT scale is to “examine relationships between student motivation and student characteristics” [22], the test results can provide information on motivational aspects that help overcome motivational barriers to learning. Schumm and Bogner adapted the wording of the SMOT to secondary school students and confirmed the SMOT as applicable to pupils after paraphrasing it [16]. The present study hypothesises that the SMOT can be adapted to a more general school motivation questionnaire [16].

The model of SMOT was grounded on the social-cognitive theory of learning [23]. Glynn et al. extracted five motivational components as essential which are intrinsic motivation in combination with personal relevance, self-determination, and self-efficacy and extrinsic motivation differentiated in grade and career motivation [21,22].

1.2. Motivation and Creativity

When using the SMOT in STEAM projects with creativity in secondary science school classes, a correlation between creativity and SMOT was verified [24,25]. Other school subjects may also assume this connection between motivation and creativity. According to previous studies, central motivation theories correlate with creativity [26]. In this context, the role of creativity in career motivation via self-efficacy promotion is particularly noteworthy [27]. Even the cognitive performance could be increased through strengthened motivation with creative educational approaches [26]. Finally, a survey of SMOT and creativity following the above-mentioned STEAM studies can indicate the instrument's validity [24–27].

1.3. Creativity

Development maturity and creativity have similar demands on school pedagogy; both require an adequate social environment to develop [5]. The practical need to try something new may trigger creativity, but only social recognition and social security will allow it to flourish [28]. Thus, everyday school education needs a social environment to foster imagination [29] and give space for creative experimenting [26]. Mau described that in the search for the possible solution to a complex problem, a “multi-level creativity” with vivid and “plastic imagination” must be developed, with which many ideas are generated, checked for adequacy, and selected for further (practical) testing [30]. Real-time creativity requires spontaneity with the ability to improvise [30]. This high level of cognitive creativity cannot be developed without the support and consistent training. In this respect, creativity is not just a pedagogical device to promote motivation. The current complex problems confronting humankind require a society with a high degree of creativity [31]. Modern

education should offer a variety of opportunities for creative thinking [31]. In instructional settings, Hsu indicated pre-creativity incubation stage as crucial for individual personality traits relevant to creativity [29]. Educators may encourage individuals to combine work in various aspects of imagination to develop their creativity.

In a creative STEM class, creativity promotes self-efficacy, which, in turn, drives (science) motivation [27,32]. Creativity is a balance between logical thinking and imagination [33], cognitive stimuli, and emotional promoters [5]. With the increasing complexity of creativity, cognitive and specific skills are required to perform creative work [34]. The four key competencies of the 21st century are critical thinking, collaboration, communication and creativity, with the last one identified as an empowering factor for motivation [35]. Perkins claimed creativity as a result of cultural contexts [36,37]. In creativity, the interaction between the individual, the product, and the social environment is regarded as essential [28]. In summary, the creative individual solves problems, designs products, or defines new issues in a field or area regarded as unique and accepted in the cultural context [38]. The possibility to act out creativity seems to promote motivation even for the subject beyond the creative approach [11].

Furthermore, learning is constructed through active participation as children engage in the learning process to act out solutions to problems at hand [4]. Similarly, Papert describes such cognitive autonomy as “intellectual self-determinism” as children act as creators rather than consumers of knowledge [39]. Creativity is precisely more than art, as appreciated in the lively discussion of STEAM (STEM with Arts) development [40]. Therefore, we are particularly interested in how creativity correlates with motivational factors.

In our search for a measurement tool for general school motivation of students, our research questions were two-fold:

- (i) Does the motivational factor structure of the SMOT exist after adapting SMOT for more general learning motivation—named SchMOT—when traditional factor analyses, as well as structural equation models, were applied?
- (ii) Is creativity fundamentally linked to motivation, so that the correlation of creativity with science motivation is also confirmed for this more general questioning tool SchMOT?

2. Materials and Methods

2.1. Research Design and Test Tools

The SMOT instrument items [16] were reformulated towards a general school motivation rather than a specific subject-related motivation (Table 1). Five subscales were applied, using a 5-point Likert scale pattern ranging from “never” (1) to “always” (5) (Table 1).

Three items could not be generalised and thus not retained (CM 10 “My career will involve science.” SE 19 “I am sure I can understand science.” IM 2 “I am curious about discoveries in science.”). According to both wording and factor analysis, item 21 of the subscale “Intrinsic Motivation” was assigned to the subscale “Career Motivation”. 5th graders report their unwillingness to answer career questions, so this subscale (Items 6–10, 21) was not considered in further analysis.

For creativity measurement, we focused on the cognitive (thinking) and non-cognitive (motivation) dimensions of creativity [41]. This cognitive creativity has the advantage of being independent of a subjective assessment of a product of a creative process. It is entirely a matter of personal thought processes, which can be either broken or made more active. We applied two subscales following the CPAC (Cognitive Processes Associated with Creativity) measurement tool of Miller and Dumford [41] modified by Conradt and Bogner [42] and extended by Roth, Conradt and Bogner [43] (Table 2). The subscale ACT quantifies cognitive processes of conscious and active thinking that can be taught and trained. Typical active forms of cognitive creativity are imagining different ways of solving a problem, visualising the result in the mind’s eye, comparing the problem with previous experiences and exchanging ideas with others [41]. The subscale FLOW monitors typical elements of a flow experience [28], which supposedly assesses motivational experiences at

school related to creativity. Flow is a mental state in which a person is fully immersed in a creative process in a feeling of energized focus, full involvement, and enjoyment [28]. Flow is perceived as resulting in high intrinsic motivation scores. Unfortunately, the ability to flow tends to vanish with age, probably replaced by knowledge-based, logical sense-making patterns [28]. A one-sided education based on verbalizing and on testable knowledge may accelerate this shift [28].

Table 1. Science Motivation Questionnaire SMOT Transcription to School Motivation SchMOT.

SMOT [16]	SchMOT
Self-determination	
14 I spend a lot of time learning science	5 I spend a lot of time studying.
12 I prepare well for science tests and labs	6 I am preparing well for school assignments and projects.
11 I study hard to learn science	7 I'm studying hard.
13 I put enough effort into learning science	8 I'm trying hard enough to learn.
15 I use strategies to learn science well	9 I use strategies that enable me to learn well.
Self-Efficacy	
17 I am confident I will do well on science tests	17 I am confident that I will do well on reviews.
16 I believe I can earn a grade of 'A' in science	18 I think I can get very good grades.
18 I believe I can master science knowledge and skills	19 I believe that I can master the content and practical requirements in class.
20 I am confident I will do well on science labs and projects	20 I am confident that I will do well in internships, projects or presentations.
Intrinsic Motivation	
4 Learning science makes my life more meaningful	1 Learning makes sense of my life.
1 Learning science is interesting	3 Learning is interesting.
5 I enjoy learning science	4 I like to learn.
Grade Motivation	
24 Getting a good science grade is important to me	14 Good grades are important to me.
21 Scoring high on science tests and labs matters to me	15 Good assessments in internships or tests are important to me.
23 I think about the grade I will get in science	16 I'm thinking about what grade I will get on a test.
Career Motivation	
7 Understanding science will benefit me in my career	10 Learning well at school will be an advantage for me in my professional career.
8 Knowing science will give me a career advantage	11 Good general knowledge will be an advantage in my professional career.
6 Learning science will help me get a good job	12 Learning for school will help me get a good job.
9 I will use science problem-solving skills in my career	13 I will need my problem-solving ability in my professional career.
3 (Intrinsic Motivation) The science I learn is relevant to my life	2 The learning material at school is important for my life.

The creativity measure employed a 4-point Likert scale ranging from "never" (1) to "very often" (4).

Table 2. Creativity Test [43].

<i>During the Past School Year—How Often Have You Done the Following?</i>
Act
When I tackled a topic, I tried to find as many ideas as possible.
To find a possible solution to a problem, I asked other people for help.
In order to find a solution, I looked at the problem from different points of view.
I brought together very different ideas to develop a new idea.
I built an old solution in a completely new way.
I have created a connection between a current problem/task and a similar situation.
I imagined a possible solution in the mind's eye to check its usefulness.
Flow
When I work intensively, I don't like to interrupt.
When I was working on a problem or task, I was totally immersed in it.
I totally lost track of time when I worked intensively.
I felt that entertaining work was automatic and effortless.
When I work intensively, I have the "overall picture" of my project in mind.

2.2. Participants

281 students of ten classes of 5th graders completed the SchMOT, while a subsample of 200 also completed the CPAC measure. The gender distribution was roughly balanced (48.4% female). The mean age was 10.82 years with a standard deviation of 0.809.

2.3. Data analysis Procedure

For statistical analyses, IBM SPSS Statistics 26.0 and AMOS 26.0 were used.

Factor Analysis

A principal component factor analysis with varimax rotation extracted four factors. The Kaiser–Meyer–Olkin (KMO) test and Bartlett's test of sphericity were applied to assess the sample's adequacy [44]. No item was dropped due to cross-loadings or low loadings.

Structural equation model (SEM) analysis was applied to evaluate the relation of motivation subscales. The SEM was based on theoretically valid variables. Estimation discrepancy applied maximum likelihood. The goodness of fit of the models was based on a chi-square test. While technically, chi-square should be non-significant in model testing ($p > 0.05$), this is very hard to achieve due to the usually large sample required. Despite a small sample, all fit indicators meet the requirements for significant results [45]. We assume indices of NFI (Normed Fit Index), TLI (Tucker-Lewis Index), and CFI (Comparative Fit Index) (good fit >0.90 , or better >0.95), and RMSEA (Root Mean Square Error of Approximation) reasonable fit <0.08 , good fit <0.05 [46].

Bivariate correlations were applied to evaluate the relation between creativity and motivation.

3. Results

3.1. Structure of School Motivation

A principal component factor analysis with varimax rotation extracted four factors based on eigenvalues > 1.0 [47], explaining 57.95% of the total variance (Table 3). The Kaiser–Meyer–Olkin (KMO) and Bartlett's sphericity test were applied to assess the sample's adequacy [44]. Reliability was examined with Cronbach's α [48]. No item was dropped due to cross-loadings or low loadings.

Table 3. Factor matrix revealed by PCA and varimax rotation, no cross loading exceeded 0.4.

Rotated Component Matrix ^a		1 SD	2 SE	3 I	4 GM	
Explained Total Variance		58.326%	18.01%	15.24%	13.80%	11.28%
SD	7 I'm studying hard.	0.746		0.351		
SD	6 I am preparing well for school assignments and projects.	0.713				
SD	5 I spend a lot of time studying.	0.706				
SD	9 I use strategies that enable me to learn well.	0.698				
SD	8 I'm trying hard enough to learn.	0.610				
SE	19 I believe that I can master the content and practical requirements in class.		0.766			
SE	20 I am confident that I will do well in internships, projects or presentations.		0.745			
SE	18 I think I can get very good grades.		0.671			
SE	17 I am confident that I will do well on reviews.		0.571			
I	3 Learning is interesting.			0.866		
I	4 I like to learn.			0.863		
I	1 Learning makes sense of my life.			0.546		
GM	14 Good grades are important to me.				0.758	
GM	15 Good assessments in internships or tests are important to me.				0.730	
GM	16 I'm thinking about what grade I will get on a test.				0.566	

Extraction method: principal component analysis. Rotation method: Varimax with Kaiser normalisation. ^a The rotation has converged in 6 iterations.

3.1.1. Reliability and Criterion-Related Validity of Total Scores

The Cronbach's coefficient alpha for calculating the reliability (internal consistency) was 0.861 and almost the exact value of 0.864 for the standardised items, indicating the even distribution of responses in all items. However, because of the low acceptance of the career items, we excluded these five items for further calculation in this study with this age group. We calculated the Cronbach's alpha for the remaining 15 items as 0.843 or 0.845 for the standardised items. These results mean that 84% of the variance in the total scores of this questionnaire can be attributed to systematic variance. These values are considered very good [49]. A value above 0.9 could indicate redundant items, which we want to avoid at all cognitive costs, especially in student questionnaires.

3.1.2. Adequacy of Correlation Matrix of Items

We calculated correlations for all pairwise combinations of the 15 items and, using Bartlett's test for sphericity ($\chi^2 = 681.909$, $df = 105$, $p < 0.001$), and a Kaiser-Meyer-Olkin measure of sampling adequacy ($KMO = 0.83$), determined that the resulting correlation matrix was suitable for factor analysis. These multivariate normality tests and sampling adequacy revealed the excellent quality of the matrix. There could be a problem with multicollinearity with the high correlation of too many items. If too many items are insufficiently correlated, this could result in insufficient common variance, leading to as many factors as items.

3.1.3. Factor Extraction and Factor Rotation

To extract factors, based on Glynn, we conducted a principal component analysis on the 15 items to identify a succinct set of factors that extract variance in descending order [50]. The principal component analysis uses eigenvalues that represent the proportion of variance accounted for by each statistical component (factor). The eigenvalues are used to derive factor loadings, which indicate how strongly certain items are associated with certain factors. Loadings of less than 0.30 are usually considered weak. Since the questionnaire is based on Glynn, we assumed four factors [21]. Together, these four factors explained 58.33% of the variance, which is considered good. The varimax rotation facilitates interpretation with the simple structure obtained.

The factor loadings from the principal component analysis with the Varimax solution are shown in Table 3. All items met the criterion of at least 0.35 loading on their respective factor [51], actually even above 0.54.

Applying a principal component factor analysis with varimax rotation extracted the hypothesised four-factor structure from the SchMOT based on eigenvalues > 1.0 [44], explaining 58.33% of the total variance (Table 3). All factor loadings show values higher than 0.5 on their main factor. The KMO value of 0.83 indicates distinct and reliable factors [44]. The Barlett test was significant ($p < 0.001$), indicating that correlations between items are significantly different from zero [52]. Diagonal elements of the anti-image matrix are 0.7 or higher. Most of the off-diagonal elements were small (≤ 0.3). The pattern matrix of the first-factor analysis after rotation with the 15-item set is shown in Table 3. Cronbach's α of 0.824 indicates high overall reliability without redundancy [53]. The loading pattern followed the one observed by Schumm and Bogner, except for item-3, which became a career motivation question after rewording [16]. Many participants commented on the items about future careers as incomprehensible or inappropriate or did not answer them. We decided to exclude the entire "Career Motivation" subscale from the further calculation.

As the significance of factor loadings depends on sample size and the number of variables, high factor loadings are required with a small sample size relative to the number of variables. For a sample size of $N = 250$, Stevens recommended a minimum loading of about 0.33. Our sample ($N = 281$) has well met this criterion [54] (p. 342).

An examination of the five factors yielded a result that confirms Glynn's finding. The motivational components that influence self-regulated learning were identified even with the paraphrased items. However, the order of importance did not follow the structure that Glynn had found [21]. The strongest factor was not Intrinsic Motivation, as in Glynn's analysis of the SMOT, but Self-determination, followed by Self-efficacy, which supports our assumption of the importance of self-determination and self-efficacy for strong school motivation (Table 3).

Factor 1 contained five self-determination items. It accounted for 18.011% of the total variation in students' responses to the 15 questionnaire items (Table 3). Factor 2 with four items on self-efficacy was the second most important and explained 15.24% of the total variation in students' responses to the 15 questionnaire items (Table 3). Factor 3 contained the three items on intrinsic motivation because after rephrasing item-3 became part of the factor career motivation. Intrinsic motivation fell from 1st place in Science Motivation to 3rd place as part of School Motivation with 13.80% of the total variation explained (Table 3) [21]. Factor 4, the last factor of the questionnaire for young adolescents, contained three of the eight items on extrinsic motivation and accounted for 11.28% of the total variation in the students' responses to the 15 questionnaire items (Table 3). We referred to this factor as grade motivation based on Glynn's classification [22].

Factor 5 contained four items on extrinsic motivation and item 2, which was assigned to intrinsic motivation in the original wording for science motivation. The five questions on extrinsic motivation asked about the students' professional future. Following Glynn, we refer to this factor as career motivation [21]. Comments or lack of responses indicated that students declined these questions because they felt too young to answer them. Accepting this, the item set was not included in the factor analysis in the present study. However, this factor should definitely be included again for older students and these items queried.

3.2. Structural Equation Model (SEM)

The path model of motivation, presented in Figure 1, fits the data well. It should be noted in the assessment that with 281 participants, the sample size must be considered critically small [48]. Nevertheless, the criteria indicate that the model fits. Despite the small sample size, the fit data score appropriately: RMSEA ($p = 0.026$) is significant at a high level, the chi-squared statistic was insignificant ($\chi^2 = 101.771$, $df = 86$, $p = 0.118$) and the values of the relevant statistics of the goodness of fit were acceptable (NFI = 0.861; IFI = 0.976; TLI = 0.964; CFI = 0.974).

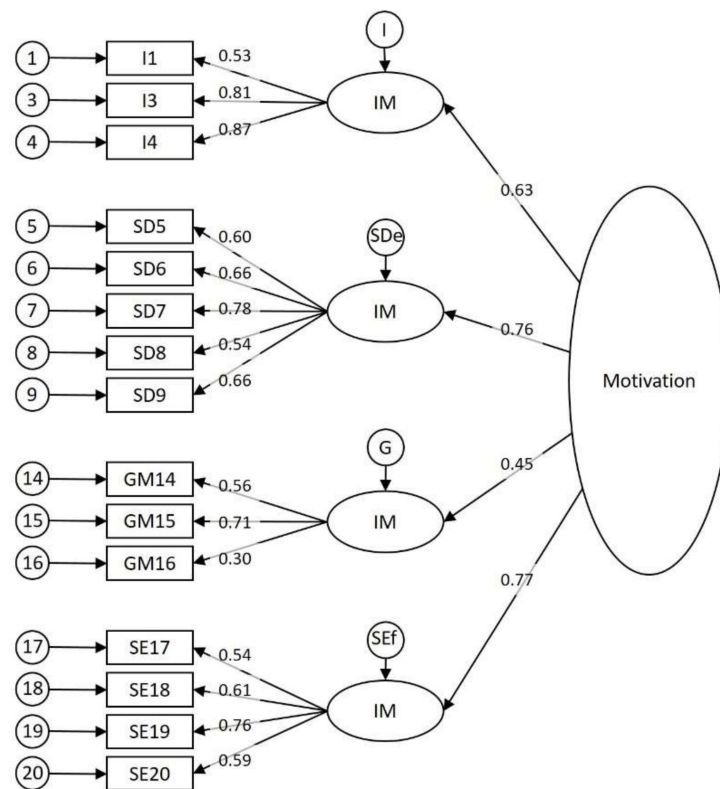


Figure 1. Model School Motivation.

3.3. Spearman Correlation

Spearman Correlation of the SchMOT with Creativity was calculated with Spearman Rho (Table 4). Motivational factors correlate highly significant with Creativity. Remarkable FLOW does not correlate with SD or IM (Table 4). Calculating an overall Mean Score for School Motivation as recommended in Schumm and Bogner [16], the correlations become clearer. The correlation of SchMOT with Act creativity is highly significant with a strong correlation coefficient (Act—SchMQ $p > 0.001$, $\rho = 0.431$). The Rho of SchMOT with FLOW is weak but highly significant (FLOW—SchMOT $p > 0.001$, $\rho = 0.255$).

Table 4. Spearman Rho Creativity and Motivation (N = 160).

		SchMQ	SD	SE	IM	GM
Act	Cor.Coef.	0.431 **	0.240 **	0.402 **	0.249 **	0.186 *
	Sig. (2-tailed)	0.000	0.002	0.000	0.002	0.018
Flow	Cor.Coef.	0.255 **	0.054	0.307 **	0.167 *	0.222 **
	Sig. (2-tailed)	0.000	0.498	0.000	0.036	0.005

** highly significant, * significance at the level of $p = 0.05$; Act, Flow: Creativity Scale Factors; SchMQ = School Motivation Mean Score of all four factors; SD = Self-Determination, SE = Self-Efficacy, IM = Intrinsic Motivation, GM = Extrinsic Grade Motivation.

4. Discussion

The launch of the hypothesised School Motivation measure is promising: With the participating age group, the expected 4-factor solution appeared as a structure with solid loading scores: Self-Determination (SD), Self-Efficacy (SE), Intrinsic Motivation (IM), and Grade Motivation (GM). Consequently, our transformation of the SMOT towards a general school motivation scale works without shifting key aspects. SE and SD are the most influential factors, followed by IM. Remarkable here is the relatively low influence of extrinsic GM on motivation.

Motivation plays a significant role in commitment and provoking help-seeking behaviours [55], a skill that is essential in learning collaboration. Teachers, therefore, need to understand the nature of students' lack of motivation to counteract adequately, for example, by supporting in self-assessment, assisting in goal setting [56], or increasing autonomy [57]. On searching for appropriate tools to evaluate motivation at school, we developed the SchMOT based on SMOT, well established with high quality and simple language [22], to identify unmotivated students so as to address their requirements [58].

Intrinsic motivation is rewarded by performing the activity itself, as perceived as inherently exciting or enjoyable. Items in the SchMOT refer to curiosity, interest, value, and enjoyment in learning. Closed to intrinsic motivation is self-determination as the autonomy we feel in our acting and self-efficacy as our perceived competence performing a task [59]. In an educational context, this self-determination refers to the control a student perceives he has over his learning. The feeling of autonomy leads to a positive impact on academic performance [57]. The SchMOT items for assessing self-determination refer mainly to students' commitment at school and are connected with (achievement) behaviour. Extrinsic motivation is driven by the fact that the social environment can judge the outcome [59]. In the SMOT, two extrinsic motivators are measured at the two opposite extremes of a continuum: grade motivation and career motivation. The first is the motive to do something because we expect a timely external compensation (e.g., a good grade as a reward); the second is the endorsement of the value or benefit of the extrinsic goal (e.g., job opportunities) [59]. According to self-determination theory, extrinsic rewards can weaken intrinsic motivation, which was recurrently verified [60].

Self-efficacy is the personal perception of competence to accomplish defined tasks and achieve specific goals [61]. According to social cognitive theory, we are more motivated to learn when we believe we can achieve the desired outcome [23,62]. In contrast, when self-efficacy is low, we fear complex tasks because of negative expectations and doubt our ability to accomplish the task [21]. Therefore, self-efficacy is very personal, dependent on the task, previous experience, and social support. With appropriate interpretation and feedback from learning facilitators, experiences can also be generalized—to the positive and negative [63]. Self-efficacy is considered a powerful predictor of academic achievement [56], moreover responsible for adolescents' career decisions [62]. Therefore, educational initiatives need to pay urgent attention to self-efficacy beliefs [64].

Since social feedback plays a crucial role in developing self-efficacy perception, a teacher can have a decisive influence on it. The right amount of challenge in the classroom is just as crucial as an appropriate feedback process: grades could be more than reward or punishment. Previous grade motivation is based on early studies of grades' effects [65]. Such education completely neglects the self-responsibility of the learner and relies solely on controlled motivation. Recent studies confirm that high controlled motivation is unlikely to predict better grades. Instead, a consistent finding was that better grades were expected when high levels of autonomous motivation coincided with low levels rather than high levels of controlled motivation [66]. For self-determination, too, the best effect seems to be in the middle ground of demand and self-determination.

The overestimated role of GM is also evident in the correlations with creativity. GM correlates only weakly with a low effect strength. Supposed grades are not used as constructive feedback and learning goal control but are perceived as rewards and punishments for diligence and talent. In that case, grade motivation becomes an extrinsic factor of motivation influenced by social factors. Avoiding penalties or achieving rewards as a behaviour motivator does not support sustainable motivation [67]. Kyllonen et al. demonstrated in a meta-analysis that motivational factors—such as personality factors—are related to educational outcomes from early childhood into adulthood [6]. It is, therefore, in the hands of the instructional designers to shape motivation sustainably.

Grade motivation is an ineffective lever in this regard. Instead, self-efficacy and self-determination should be promoted, calling students to take responsibility for their learning path. Individual self-determination needs balance with trust in the teacher, who shapes

the learning environment but allows the pupil to shape the course her-/him-self freely; the teacher's importance has been proven many times for long-term learning [68]. The mix of "intellectual self-determination" [39] and social contact with a teacher in the role of a tutor rather than a "knowledge broker" promotes long-term learning success [69]. Authentic learning is intrinsically intertwined with socialisation issues and identity, and it would be a mistake to separate them.

People are considered motivated when they want to achieve something and pursue a specific purpose with the behaviour [70]. In contrast, amotivated behaviour is not guided by any intention and is not aimed at a future state. Educators often notice this through "loitering" or affective, unacceptable reactions such as anger. To counteract this, educators must remember that these actions also serve to satisfy motivational needs such as emotional, physiological (drives), or psychological needs.

Intrinsically motivated behaviour is primarily connected with the need for competence and autonomy, extrinsically, and the need for social inclusion [70]. Self-determination, or autonomy, takes a prominent position [70]. Appropriate feedback is particularly important to promoting motivation, as proven in learning development meetings (formative assessment). There is evidence that intrinsic motivation decreases when an intrinsic activity is extrinsically rewarded because self-determination is undermined. However, external reward in the form of feedback can maintain intrinsic motivation [71] because it meets the psychological need for social inclusion. Thus, through appropriate feedback, an extrinsically motivated behavior can become a self-determined action through internalisation and integration so that the actor perceives himself as self-determined [70].

Informative assessment, a key element, provides practical feedback to the learner by the teacher [72,73], enhancing learner motivation [74,75]. It is essential that feedback is not judgmental but practical and helps the student to reflect. Feedback positively affects the learning process and the learners' motivation when oriented towards the questions: "What are my goals?", "What progress am I making towards these goals?", "What actions do I need to take to make more progress?" [75] (p. 86). Feedback about the learner's personality is usually meant benevolently as praise but usually proves to be a barrier without benefit because it judges the learner [75].

Attention to self-efficacy and self-determination in learning represents an extension of students' self-responsibility for learning and personal development [76], in the tradition of Piaget [4], who emphasised the importance of action and problem-solving in education [77]. In other words, learning is constructed through active participation as children engage in the learning process to act out solutions to problems at hand. Similarly, Papert describes such cognitive autonomy as "intellectual self-determinism" as children act as creators rather than consumers of knowledge [39]. Creativity is precisely more than art, as it is controversially discussed in STEAM development [40]. Therefore, we are particularly interested in how creativity correlates with motivational factors.

Mulyadi, Basuki, and Rahardjo confirmed the importance of academic self-efficacy and creativity through adequate tutorial guidance to develop effective self-regulated learning with their model [5]. However, the relationship between self-efficacy and creativity could not be verified because the implemented test measured artistic creativity but not cognitive creativity [5]. In a hands-on experiment class, Mierdel and Bogner found a gender-specific difference in the importance of creativity for academic learning success [26]. For girls, correlations were observed between cognitive achievement and the creativity subscale Flow. A path analysis of five STEAM modules within an international EU project supported the role of creativity for Career-Motivation by promoting Self-Efficacy [27]. The correlation of Creativity Act and Flow with self-efficacy is substantial and could be increased with STEAM modules, especially for Flow with self-efficacy [27]. These results underline those of the present study and support the recommendations for action according to the self: Self-efficacy can be supported in the classroom through appropriate tutorial teaching and project-based feedback.

The correlation of self-efficacy with creativity also suggests that creative teaching approaches strengthen self-efficacy, especially for the Act. The ACT subscale is linked to active cognitive processes associated with creativity [41]. An open classroom culture could enhance this cognitive form of creativity, where students are encouraged by mutual support to talk about experiences regarding similar problems or to imagine a solution. Idea manipulation, imagery, incubation, idea generation techniques, analogical thinking, and imagination can actively be trained. It is easier to promote and establish Act than Flow in education [25]. Nevertheless, the potential and effects of flow should not be underestimated in the classroom.

The correlation of Self-Efficacy with FLOW indicates that self-efficacy can have an emotionally rewarding effect since, above all, flow indicates a feeling of happiness at work. Flow, however, cannot be actively mediated but requires a suitable working space that corresponds to a self-efficacy-enhancing learning environment: self-regulated, independent work in a tutor-supported classroom.

Flow is a state of consciousness that can be experienced during creative processes. It is characterised by complete absorption in an activity [28]. Flow has a self-rewarding effect and promotes intrinsic motivation. Apparently, the ability to experience flow seems to disappear with age in many people and is probably replaced by knowledge-based, logical patterns of sense-making [28]. A one-sided education based on listening and pure, testable knowledge transfer could promote these tendencies. The result is that people are deprived of this happiness-emphasising motivational support and that the creative process's capacity disappears. Flow is the balance between challenge and confidence. This makes it the perfect indicator for a successful lesson that is challenging and yet not overwhelming. Lessons with a design and content that allows students to sink into their tasks' solutions can promote motivation and creativity. This requires an adequate lesson structure with an open mind, space, and personal time management. Double lessons for fewer interruptions in the learning process are a practical start. Regular evaluation rituals such as the spider's web/bull's eye or digital quizzes give feedback on the students' tension and boredom status, helping the teacher balance over- and under-challenge. Above all, the teacher needs an open attitude through which, in the role of a tutor, he or she allows the students to take responsibility for their development and learning within the framework of their growing abilities.

Self-efficacy beliefs are pretty flexible and very sensitive to changes, such as contextual factors (e.g., changing environmental conditions) or personal factors (e.g., coaching or motivation level). Creative design for STEAM modules can create a motivating and empowering work environment that increases students' self-efficacy (e.g., [11,24–26,78]).

These results argue for the value of experimenting with classroom methods, and ways of working that may promote self-efficacy, self-determination and creativity in learners. Until now, there has been no brief evaluation tool for surveying school motivation. The tool presented here can close this gap and stimulate the development of creative teaching that promotes self-efficacy.

5. Limitations

A very young sample group was chosen to develop and test a questionnaire on general school motivation. The advantage of this age group is that, in our experience, they are very willing to cooperate and complete questionnaires responsibly. Furthermore, language problems in the questions are noticed more quickly since questions that the youngest pupils well understand are certainly also understandable for older pupils. However, the pre-selected group of 5th graders with a low age range is problematic. This problem led to the loss of the 5th factor, career motivation. It was proven in the present study that 5th graders in Central Europe do not work with this concept. However, career motivation could be an important indicator of the future-oriented achievement readiness of adolescents, so for older students, this factor urgently needs to remain in the questionnaire. Therefore,

the generalisability of this study's results must still be looked at critically and verified in further studies with older students.

6. Conclusions

Modern education must reflect social developments and needs. Today, self-efficacy and personal responsibility are required as essential competencies. A test instrument measuring general school motivation helps to monitor the effectiveness of newly developed teaching concepts and principles on students' motivation. The present study confirmed the SchMOT as a test instrument based on the established SMOT, and it also points to the overall importance of self-efficacy for learning motivation. Additionally, the SchMOT was correlated with cognitive creativity in everyday school in practical application. Of particular importance in the recent findings is the relationship between self-efficacy and creativity. The results indicate that promoting creativity also supports self-efficacy, resulting in performance readiness. Subsequent studies could focus on appropriate professional training to enable teachers to intervene with creativity and self-efficacy. The effects of the professional training can be evaluated with the new SchMOT.

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