School Does not Kill Creativity

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Abstract

Based on meta-analyses, intervention studies, and investigations from the outside of creativity literature, this paper makes seven evidence-informed propositions about the relationships between creativity and school functioning. First, creative abilities are drivers, not brakes of school achievement. Second, the negative attitudes toward creative students sometimes observed in schools usually concern a small and particular group of creative students: those who are most impulsive and nonconforming. Third, creativity-relevant mental processes support learning. Fourth, creative learning occurs when students can co-discover new, meaningful knowledge. Fifth, school education supports—albeit likely to a different degree—both intelligence and creativity. Sixth, both creative and learning processes are most effective when accompanied by agency and value: feeling confident and valuing creativity and learning are instrumental for generating and directing motivation. Seventh, in both creativity and learning processes, self-regulation is vital.

Keywords: creativity; learning; myths; agency; self-regulation

School Does Not Kill Creativity

Debates on creativity are full of myths. Some of them are relatively harmless; for example, it does not really matter whether you believe that creativity is located in the right brain. Others, however, could be pretty damaging. Consider a widely held opinion that creativity requires exceptional talent and is limited to genius-level accomplishment (Plucker et al., 2004; Sawyer, 2011). If people believe that, they will be unlikely to engage in creative activity. Thus, such a fixed creative mindset (Karwowski, 2014), the conviction that creativity is unchangeable and inherited, might diminish creative confidence and hinder the chances for creative accomplishments.

Similarly, there is a widespread opinion (e.g., presented on the cover page of Newsweek in July 2010) that people's creative abilities decline in the last several decades. It was broadly advertised based on Kim's (2011) analysis of re-norming Torrance Tests of Creative Thinking data. Again, such a conviction could make many people feeling helpless and decide not to try creative behavior. Yet are we really in crisis? Importantly and fortunately, there is no evidence for that (Barbot & Said-Metwaly, 2021).

One of the most prevalent myths states that schools and education systems are creativity killers. The late Ken Robinson's famous (and rhetorically excellent) Ted talk ("How Schools Kill Creativity," 2006) became viral, spreading the message that creativity is not only not supported in schools but is instead quite brutally stifled. Indeed, creativity and school are often perceived as opposites. One reason for that is a highly romanticized perception of a child confronted with a bureaucratized system schools represent. According to this perspective, children are creative by nature, and schools, as secondary socialization instruments, are anti-creative by the same spirit. The obvious problem is that both these assumptions are false.

Another source of these biased beliefs refers to creators' biographies: indeed, many Nobel Prize laureates were mediocre students, and some of them remembered their school education as a nightmare (Albert Einstein serving as the most famous school-hater). Examples of prominent figures who did excellent in school, such as John Locke or Anna Freud (see Simonton, 2002), are far less advertised. Yet again: cherry-picking famous figures who disliked school does not seem like a reasonable argument in a scholarly debate either.

This paper overviews contemporary research to explore whether, how, and why the links between creativity and learning are so easily oversimplified. First, I discuss the research on the relationship between creative abilities and school achievement. Then, I discuss how creative abilities might inform school learning; to what extent processes usually engaged in creative problem solving and creative thinking, be it divergent thinking, imagination, or insight problem-solving, are instrumental in doing well in school. Next, the links between schooling and creative thinking development are analyzed. The question here is whether school education can improve creative thinking as effectively as it enhances intelligence. Finally, I move to the non-cognitive factors relevant for both creativity and school learning, particularly self-beliefs and self-regulation. The paper closes with recommendations for future research with the hope of bringing a more realistic and less ideologized picture of the relationship between creativity and learning.

Creative Abilities and Academic Achievement

Creative abilities are positively related to academic achievement. As a meta-analytical summary (Gajda, Karwowski, et al., 2017) has demonstrated, the relationship between students' creative abilities and their academic achievement is $r = .22$, so weak-to-moderate in terms of the effect size, according to usually applied criteria (Cohen, 2013; but see also Gignac & Szodorai, 2016, for modified criteria). Although this relationship was further moderated by several factors, such as being stronger in verbal than figural creativity tests, it was positive in all the analyzed cases. Of course, such an effect leaves

room for exceptions; certainly there are scholastically efficient students who do poorly in creative thinking tests, and—vice versa—students whose poor school grades are associated with high divergent thinking scores. Indeed, on average the links are positive.

However, given that many potential confounds were not controlled for, the risk exists that this average correlation is overestimated. Some variables are closely associated with both creativity and academic achievement: consider intelligence (Deary et al., 2007) or personality traits, such as openness to experience or conscientiousness (Poropat, 2009). Intelligence is the most robust predictor of academic achievement and a systematic correlate of creative abilities (Gerwig et al., 2021) and creative achievement (Karwowski et al., 2021). Openness is considered "a hungry mind trait" (von Stumm et al., 2011), driving curiosity for learning and personality fuel of creative functioning (S. B. Kaufman et al., 2016). Conscientiousness—among others—denotes perseverance important for school learning, while its links with creativity are more complex (Feist, 2019; King et al., 1996). Therefore, the meta-analytically obtained positive correlation between creative abilities and school achievement might be overestimated.

To examine this possibility, I created a meta-analytic path model based on correlations between the most relevant predictors of academic achievement (and correlates of creativity) obtained in different meta-analyses (see Table SOM1 in Supplementary Online Material [SOM] as well as Figure 1). Using meta-analytically obtained correlations and sample sizes, I fitted a series of path models to control the shared variance between different predictors of school achievement. The first model (see Figure 1, model A) was fully saturated, being a meta-analytical regression model, so no model fit indices are reported. Model B omitted the correlations between intelligence and conscientiousness, and creativity and conscientiousness, while model C estimated the links with creative abilities modeled as a mediator being driven by intelligence and openness. As predicted, the link between creativity and academic achievement dropped slightly, from $r = .22$ to $r = .16$. Nevertheless, even after controlling for relevant covariates, it was still positive and significant. Thus, at the individual differences level, academic achievements and creative abilities are positively intertwined. Perceiving creative students as doing poorly in school is contrary to what the research shows. Creative abilities are cognitive abilities related to intelligence, executive functions, attention, or memory. This is the main reason why they are helpful in learning. The open question, explored later, is whether creativity plays any specific function and role above and beyond other cognitive abilities.

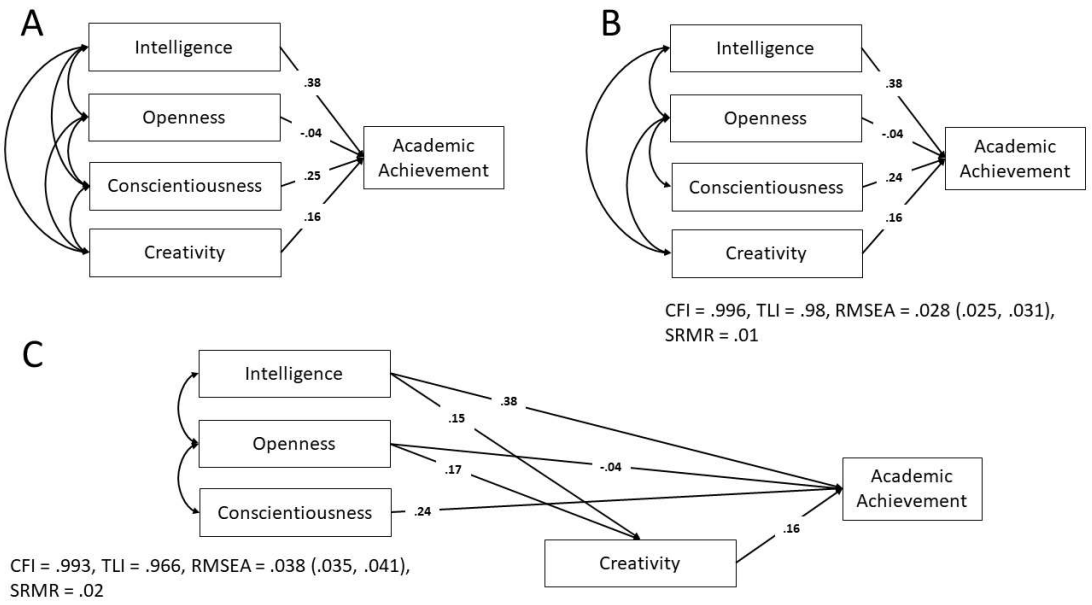

Figure 1. Meta-analytical path models of the links between creativity and academic achievement when intelligence, openness, and conscientiousness are controlled. Model A is a fully saturated path model with correlated predictors. Model B considers only statistically significant correlations between predictors, while model C examines whether creativity mediates the links between intelligence and openness and academic achievement. See SOM for meta-analytically obtained correlations between predictors.

Quite ironically, though, there are also reasons to believe that meta-analytical estimates are underestimated. Consider three arguments. The first, most technical one, is that they were not corrected for measurement error, so the true correlation between latent constructs has to be stronger than reported. Even looking at detailed results provided in the Gajda and colleagues' meta-analysis, it becomes evident that the links are more robust when the measures are more reliable. For example, the correlation between creative abilities and standardized achievement tests was significantly stronger than the connection between creativity tests and grade point average (r = .28 and r = .19, respectively). A more reliable measurement means more accurate estimates.

The second argument is conceptual. Something creative is both original and appropriate, yet creativity tests usually focus on originality. It is sporadic when they explicitly include and score appropriateness. And vice versa: developers of school achievement tests are more interested in correct answers than originality of the processes that lead to these answers, or uniqueness of the responses. Thus, because measurement focuses on originality in creativity tests and appropriateness in academic achievement tests, the links are likely underestimated as tests cover only a part of the construct supposed to be measured.

Thirdly and finally, creativity and school functioning could be assessed in many different ways. As proposed elsewhere (Karwowski, Jankowska, et al., 2020), it is helpful to frame it as a continuum of possible approaches, starting from the domain-general, separated assessment of creativity and learning, through more domain-specific yet still separated assessment of these constructs, all the way to domain-specific combined assessment, and finally: to the situated, dynamic assessment of creativity and learning. The first approach, where creativity and learning are measured separately as domain-general skills, is a case usually observed in empirical research. The measures are disjointed, and constructs are tapped in a domain-general manner. The other end of the continuum refers to a case when creativity is actively involved in learning, and assessment of creativity and learning is done dynamically and simultaneously. Thus, the dominant, disjointed domain-general assessment provides the lower bound of the estimate of the links between creativity and school functioning. Indeed, when creativity and learning are measured using specifically developed instruments (see, e.g., Creative Learning in School Achievement Test in Karwowski, Jankowska, et al., 2020) that focus on creativity within school achievement subjects, the links are visibly stronger (see bolded values in Figure 2).

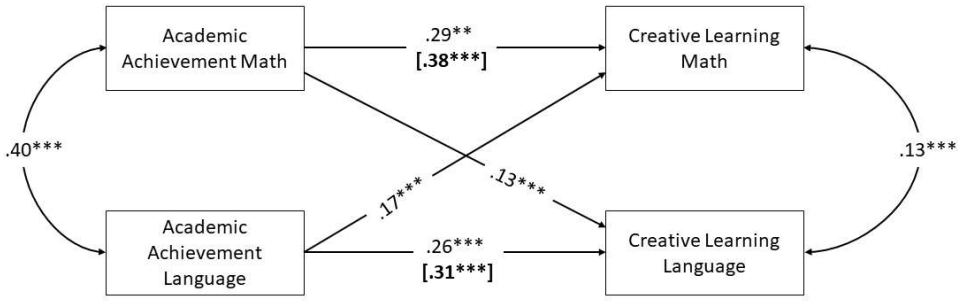

Figure 2. The relationship between domain-specific academic achievement (math and language) and creativity in these domains. Bolded values in parentheses are correlations; all other values are standardized regression weights. The figure was created based on the results reported in Karwowski, Jankowska et al. (2020).

All this leads to the first proposition, that is:

Proposition 1: Creative abilities are drivers, not brakers of learning and school achievement.

All other things being equal, divergent thinking is, on average, positively related to school achievement. Creative students are, in most cases, better students than their less creative peers. And finally, students who receive the bests grades or achieve the highest results in standardized achievement tests are, on average, more creative than those who struggle with learning. More importantly, creative abilities explain school achievement variability beyond and over intelligence, and less intelligent students who are highly creative perform well in school (Kim, 2008).

If It's So Good, Why Is It So Bad? The Creative Style Might Matter as Well

Even if creative students do well in school, it does not mean that they are always well-adapted to all requirements met in a typical classroom. Indeed, some studies show that teachers do not particularly like creative students (Westby & Dawson, 1995). What causes this anti-creative antipathy (Cropley, 2010)? One possible answer refers to a particular understanding, or implicit theory, of creativity among teachers. This understanding describes creative students as "wild bohemians" (Dawson, 1997): quite poorly adapted, often not-well socialized individuals. While this description is inconsistent with research that shows that creative students are often sociometric stars (Hopp et al., 2019; McKay et al., 2017), it fits well in the romanticized image of a creator as impulsive, arrogant, and highly independent (Proudfoot & Fath, 2020). It might sometimes be the case of great scholars or artists (Feist, 1998), yet it does not fit creative students' characteristics. Meta-analyses show that such traits as agreeableness (Karwowski & Lebuda, 2016; Puryear et al., 2017) or subclinical psychopathy (Lebuda et al., 2021) are virtually unrelated to creative abilities.

Therefore, it seems fair to state that teachers' skepticism is oriented toward a very particular type of creative students: those who could be described as *rebelliously creative* (Karwowski, 2017), highly independent, and engaged in defending their position. There are, however, many more students who are creatively skilled yet behave properly and are well-aligned with school requirements. The differences are in style or certain personality factors, not in the level of their creative abilities.

What's more, we should also do not overclaim that teachers perceive creative students as poorly adapted. Consider, for example, a recent international study that explored creative students' perception among teachers (Karwowski, Gralewski, et al., 2020). It found that teachers primarily associated creativity in their students with cognitive characteristics and rarely described them as arrogant, independent, or nonconformist. To be more specific, this study asked teachers to rate the extent to which each of the adjectives or short characteristics provided to them describe creative students, using a 5-point Likert scale. As illustrated in Figure 3, all negative characteristics were listed as the least typical for creative students, and—comparing the means to the value of 3, meaning a middle-point of the scale—they were not considered typical for creative students. Thus, what this large study on teachers demonstrates, is that creative students *are not* perceived as disobedient, undisciplined, or arrogant.

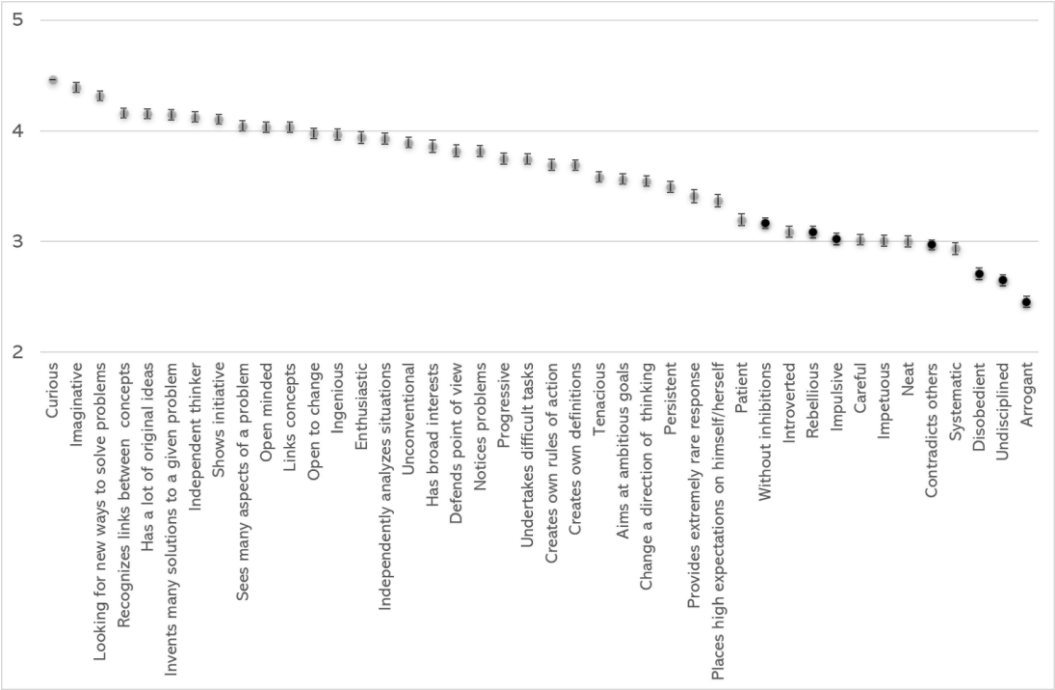

Figure 3. Profile of creative students' perception by teachers from Australia, Italy, Poland, and the UK, based on raw data presented in the appendix of Karwowski, Gralewski, et al., 2020. Error bars are 95% confidence intervals across point estimates. Solid black dots refer to negatively perceived characteristics. The original scale used by participants was 1-5.

What explanation of these apparently contradictory results does the literature suggest? As Karwowski and Jankowska (2016; see also Lassig, 2020) proposed, creativity might be considered in a typological manner that takes into account that creative students can behave in very different ways and be classified into different types or categories. When teachers do not necessarily like to have very creative students in their classrooms because they perceive them as causing disciplinary issues (Kettler et al., 2018; Westby & Dawson, 1995), in fact, they refer to only a small portion of all creative students. While original responses might lead to chaos during the class, overall, there is no direct evidence that creative students cause problems in the classroom. Rather, the problem might lie in their perception that is only partially consistent with their traits. Therefore:

Proposition 2: Some creative students do not perform well at school or are viewed unfavorably by their teachers not because of their creative abilities, but either due to lack of motivation or to a greater extent due to their non-conformism. The majority of creative students functions well in school.

Knowledge is Necessary to Create, yet Creativity Builds Knowledge

So far, I argued that creative students learn well, and only a small fraction of them is poorly adapted. But what is the exact mechanism behind the links between creativity and learning and, consequently, school achievement? This question has been approached from many perspectives, yet two ostensibly contradictory illustrate the common controversies well. The first argues that creativity in school learning can occur only if a student has sufficient domain-based knowledge. The other states that creative thinking allows for discovering rules and solutions and helps in gaining new knowledge. As I argue below, both these standpoints are consistent with evidence, so the controversy is superficial.

The first approach perceives domain-based knowledge as a necessary condition of creative functioning within a specific domain, including school subjects. It is—directly or not—referring to a

revised Bloom's taxonomy (Anderson & Bloom, 2001), with "create" being located on top of the learning pyramid. While the fundamental assumption that knowledge is necessary to create is commonsensical and intuitively appealing, two things should be mentioned here. First, Bloom's taxonomy was never proposed as a pyramid (Kirschner & Hendrick, 2020), so the assumption that lower levels must be achieved to move to the higher ones does not stem from the original conceptualization. Second, this taxonomy was developed as informing assessment, not instruction or explaining the mental process engaged in learning. Thus, it was never Bloom's or his collaborators' intention to posit that all previous steps must be taken before an individual can create something. That being said, there is empirical evidence that domain-specific knowledge serves as a necessary condition for highly creative solutions obtained in this domain (Karwowski, Jankowska, et al., 2020). While a high level of domain-specific knowledge does not guarantee creative solutions in these domains, the lack of or very limited knowledge reduces such solutions' chances.

There is also another consequence of this reasoning. If creative solutions in, let's say, math require a solid basis of mathematical knowledge, it naturally leads to the conclusion that creativity is domain-specific. Assuming that deep declarative knowledge of history would make students creative in math is nonsensical as long as there are no arguments for far transfer (Barnett & Ceci, 2002). Compare the relations between school achievement and creative results in math and language presented in Figure 2. While school achievement across domains was highly correlated, creativity scores were only very mildly linked. Thus, creative thinking and problem-solving in school domains naturally benefit from knowledge in this specific domain.

Still, there are also convincing arguments that creative processes are instrumental for learning and gaining new knowledge (Agarwal, 2019). Teaching children to think creatively helps them solve problems based on deduction – much more typical for school settings (de Chantal et al., 2020; Markovits & de Chantal, 2020). Pretend play and imagination in childhood predict mathematical achievement longitudinally (Wallace & Russ, 2015). Finally, creative teaching supports school learning as well (Schacter et al., 2006). Thus:

Proposition 3: Creativity-relevant mental processes support learning. Knowledge is a building block of creativity.

Creative Learning Requires Meaningfulness

As argued, creativity-relevant processes help acquire knowledge, and knowledge is the building block for further creativity. Still, too often, the processes that lead to gaining new knowledge are algorithmic, poorly engaging, and creative skills can hardly be effectively utilized. When does learning become creative?

A recent theoretical model of creative learning (Beghetto, 2016; Beghetto & Schuh, 2020) focuses on psychological mechanisms typical for the individual creative process and on socio-psychological mechanisms of classroom functioning. Consequently, creativity is theorized as occurring both at a subjective (creativity as part of the act of learning) and intersubjective (learning as a creative act) level (see Beghetto, 2016). On a personal level, students exercise their creativity by developing new and personally meaningful ideas, insights, and understandings within the context of particular academic constraints. This strongly resembles the so-called mini-c creativity (Beghetto & Kaufman, 2007; J. C. Kaufman & Beghetto, 2009). On the intersubjective level, students who share their unique and academically accurate insights and interpretations contribute to others' learning. Therefore, creative learning is a combination of intra- and inter-psychological processes that result in a new and valuable understanding, both from the student and their peers' perspective.

However, according to Beghetto (2016), certain conditions have to be met for creative learning to occur. First, educational content presented to students should be optimally discrepant. Only the stimuli students' attention can be focused on will remain in their memory for an extended period, and already known content, or that which lacks sufficient novelty, will remain unnoticed. This process, related to a classic Piagetian assimilation-accommodation idea, is a clue of creative learning as it leads to new knowledge (e.g., Alexander et al., 2009).

Second, new educational content must be combined with previously acquired content. Such a process of integrating new and unclear content with already acquired knowledge is the core of a creative process and leads to new ideas. Students who have already noticed new content, attempt to make sense of it by referring it to their previous knowledge. It is possible when the purpose of the result of that very combination is personally meaningful. Should making sense of the created combination prove impossible, which may be caused by too little stock of initial knowledge or the lack of belief in one's capabilities, the student will most certainly resign from further attempts. However, if it does become possible to create a meaningful combination, it will translate into a new understanding. Changing the student's understanding occurs in the intra-psychological sphere and results from the process of creativity-in-learning.

A possibility to share new understanding with other students and the teacher is the next stage of the creative learning process. Revealing the new understanding on a classroom forum simultaneously marks the transfer from intra- to the inter-psychological sphere because it is applicable not just to the student themselves but also to their social environment. Consequently, ideas expressed in class may be assessed in two ways: if they do not differ from other students' ideas, the group considers them applicable but not creative. However, suppose the group finds new understanding to be novel enough and fitting general knowledge. In that case, the revealed idea has a chance to become a new learning stimulus both for other students and for the teacher during creativity-in-learning. Here, the teacher must provide occasions for exchange of thought between and among students (Gajda, Beghetto, et al., 2017). Should such circumstances be missing, even the most valuable ideas may pass unnoticed. For a new concept to turn into a creative input in the current knowledge of others, the teacher and the remaining students must undertake an attempt to understand it. In a confrontation with such a surprising idea, the teacher does not always know how to behave: ignore the idea and consider it a pure misunderstanding of the theme or attempt to understand it and risk disrupting the lesson (Beghetto, 2007). In the first case, if comprehension difficulty is the reason for rejecting the student's idea, their potential and the entire creative process fades, which negatively influences the process of learning and undertaking further attempts to share their ideas with others. In the second situation, when the teacher attempts to understand the new concept, it may prove that it is in line with other students' understanding. Yet, it is a two-way process that occasionally requires modifying a student's understanding and adjusting to the teacher's expectations. At that time, when the creative process moves a step forward, initiation of a class discussion becomes the right solution; it renders it possible for students to exchange ideas and obtain feedback on them. When the environment considers the concept to be coherent and simultaneously new, it may become a creative input to their understanding.

Proposition 4: Creative learning occurs not only when creative operations are engaged in learning, but when the learners have the opportunity to co-discover and co-create the new, meaningful knowledge.

Schooling Supports Intelligence. Does It Influence Creativity as Well?

Is staying longer in school beneficial for creativity? Or, to put this question differently, does our creativity develop thanks to schooling? While skeptics would probably answer negatively, the evidence for their claim is scarce. One line of reasoning could refer to the so-called fourth-grade slump in

creativity. However, a recent meta-analysis (Said-Metwaly et al., 2020; see also: Fusi et al., 2020) did not identify such a slump, but a relatively linear increase of creative abilities during school years. The overall rise in creative abilities is generally observed in well-powered studies (e.g., Gralewski et al., 2016), although there is some evidence that school-related factors may be associated with drops in creative abilities (He & Wong, 2015; Krampen, 2012). Overall, however, even if any slump exists at all, it is not clear whether its cause is environmental (e.g., school-based), or rather developmental. Indeed, it is possible that creativity, especially figural creativity or creative imagery, may temporarily suffer when an intensive development of other, more convergent or verbal operations takes place (Karmiloff-Smith, 1994). This might be associated with school requirements, but at the same time, it could also be caused by school-independent developmental trajectories. However, given that most of the studies instead indicate a growing increase in creativity, criticizing the school on that matter is poorly justified.

There is another, albeit indirect, reason to assume that school is more beneficial than its critics would like to admit. As a recent meta-analysis demonstrated (Ritchie & Tucker-Drob, 2018), each year of education increases intelligence by 1-5 IQ points (depending on the method of estimation), which is consistent with previous results showing that educational reforms that extend compulsory education benefit intelligence (Brinch & Galloway, 2012; Ceci, 1991). Of course, intelligence is not creativity, even if these two constructs robustly correlate with each other (Gerwig et al., 2021) and share some critical cognitive basis (Benedek et al., 2012; Frith et al., 2021). Still, however, if education is beneficial for intelligence, can it be harmful to creativity?

One answer to this question could argue that intelligence is mainly related to solving convergent thinking problems, while creativity is more strongly based on divergent thinking or imagery. Indeed, it is entirely possible that school supports one but not the other. For example, one study (Gralewski & Karwowski, 2012) found that in schools where the correlation between students' creativity and their school grades was high, the correlation between intelligence and school grades tended to be relatively low and vice versa. That might suggest different routes to how more convergent and divergent skills are engaged in learning and how education could support both creativity and intelligence. However, a large longitudinal study found that intelligence at age 11 predicted participants' education 40 years later and that it was participants' educational level that explained a significant and robust portion of the variability in creative activity and achievement (Karwowski et al., 2018). Thus, although the direct evidence is lacking, there is an indirect reason to expect that:

Proposition 5: Education supports—albeit to a different degree—both intelligence and creativity

Both Creativity and Learning are Driven by Agency

A confluence of different factors causes educational and creative successes. Cognitive abilities are probably the most important, yet they are not the only element in this mosaic (Lubart & Guignard, 2004). Thus, it is not particularly surprising that both educational researchers and creativity researchers pay attention to non-cognitive factors that might explain the likelihood of effective learning and creativity. Two broad factors, namely confidence and value, play a special role in explaining why and with what outcomes people engage in learning and creativity. As the creative behavior as agentic action (CBAA) model (Karwowski & Beghetto, 2019) posits, creative abilities alone cannot explain satisfactorily why some people successfully conduct creative behaviors. This model seeks a potential mechanism in the sense of agency driven by creative confidence—both, more stable creative self-concept and dynamic creative self-efficacy (Beghetto & Karwowski, 2017)—and valuing creativity. Thus, CBAA perceives creativity as a decision driven by an interaction between creative potential, confidence that individuals can fulfill tasks at hand, and the conviction that being creative matters for someone's identity. Indeed, even high creative ability does not inform behavior and achievement when people do not value creativity.

The CBAA model has been largely inspired by prominent works in educational psychology, particularly the theoretical accounts that highlight the importance of self-concept for achievement (Marsh et al., 2018; Sewasew & Schroeders, 2019; Wolff, Helm, et al., 2018; Wolff, Nagy, et al., 2018) and the expectancy-value theory of motivation (Wigfield & Eccles, 2000). Therefore, both creativity and learning (and, consequently, creative and academic achievement as well) are not only driven by cognitive skills (intelligence, divergent thinking, etc.), but also self-concept (creative and academic) and valuing both the task at hand and the domain of functioning (be it creativity or school learning). This similarity leads to another question, namely, can creative self-perception (i.e., creative self-concept or creative self-efficacy in certain school subjects) explain the variance of school achievement above and beyond academic self-concept? In other words, does perceiving oneself as creative in math explain math achievement over academic self-concept? There is empirical evidence to believe so (Putwain et al., 2012), yet future research is needed to understand the nuances of these links better. Therefore:

Proposition 6: Both creative processes and learning processes are most effective when accompanied by agency and value: feeling confident and valuing creativity and learning is instrumental for directing the motivation.

Self-Regulation is Key

Another similarity between learning processes and creative processes is that their effectiveness is largely dependent on self-regulation. Self-regulation could be considered in two different ways, rooted in different theoretical traditions (Malanchini et al., 2019). The first is cognitive, and it primarily focuses on executive functions: working memory, updating, inhibition, or cognitive flexibility (Diamond, 2013; Hofmann et al., 2012). While their role for intelligence (St Clair-Thompson & Gathercole, 2006) and school learning has been evident, it has not been so apparent for creativity. Quite the opposite, creativity has rather been associated with uncontrolled, mind-wandering related behaviors (Agnoli et al., 2018; Baird et al., 2012; Hao et al., 2015; Lebuda et al., 2016): likely, one of the reasons why creative students were perceived as so chaotic. The last two decades provided strong empirical support for the top-down theory of creative thought (Benedek, 2018; Benedek et al., 2014; Zabelina et al., 2019), rather than seeing creativity as entirely driven by bottom-up, spontaneous, and uncontrolled processes. Indeed, solving creative tasks (not to mention engaging in longer-term creative projects) requires inhibition of common and ordinary ideas, mental search for different possibilities, keeping the categories in short-term memory, and the like. Overall, the more efficient someone's executive functioning, the higher their intelligence, divergent thinking (Frith et al., 2021), and school achievement. Thus, cognitively understood self-regulation is critical for creativity and learning: another reason why they should not be too quickly disjointed.

The second perspective, rooted in personality theories (McCrae & Lckenhoff, 2010), focuses on self-regulation as a set of metacognitive and strategic behaviors of planning, monitoring, and assessing behavior while dealing with different tasks: both school-related and creative. The role of various strategies during creative activity has already been highlighted (Ivcevic & Nusbaum, 2017). It has been demonstrated that people use different strategies when solving even short-term tasks (Gilhooly et al., 2007; D. M. Jankowska et al., 2018; Rubenstein et al., 2020). A conceptualization of creative processes in terms of self-regulated learning (Rubenstein et al., 2018) emphasizes similarities between the phases of forethought, performance, and reflection in learning and creativity (see also Zielińska et al., 2020). What's more, these phases and the strategies identified within them (e.g., obstacles expectation, uncertainty acceptance, adjusting approach, managing goals, emotions regulation, readiness to share, and improvement approach) were found to be relevant for many different creative domains (Zielińska, Forthmann, et al., 2021).

A recent longitudinal study (Zielińska, Lebuda, et al., 2021) has also shown that the links between divergent thinking and creativity in learning are mediated by creative confidence and effective self-regulation in learning (see also: Kunat et al., 2019). This finding emphasizes that self-regulation is a critical element of the complex relationship between abilities, self-beliefs, and outcomes. Importantly, its role is equally vital for creativity and learning. Therefore, the seventh and final proposition:

Proposition 7: In both creativity and learning processes, self-regulation is central.

Discussion

Saying that schools always support creativity would be great overkill. Indeed, school instruction is too often focused on "sameness," while creativity is built on differences (Glăveanu & Beghetto, 2017). Teachers are not the best at identifying creative students (Gralewski & Karwowski, 2019), and it happens that their understanding of creativity is not necessarily consistent with scholarly theories (Bereczki & Kárpáti, 2018; Gralewski, 2019; Gralewski & Karwowski, 2018). Classroom discussions are often disrupted and provide little space for mistakes and explorations (Beghetto, 2007; Gajda, Beghetto, et al., 2017), and there are serious obstacles to supporting creativity at the level of school climate (Ahmadi et al., 2019; Runco et al., 2017): be it lack of time, permanent assessment, or competition. Finally, although policymakers continuously recognize the importance of creativity, there is a clear gap between what is postulated and what and how it is implemented (Patston et al., 2021).

Yet, the very natural observation that school should be improved and changed to serve students' creativity better should not be too easily equated with the claim that current education kills creativity. School systems differ, and so do schools within each system (Besançon & Lubart, 2008). Alternative and experimental schools that explicitly list creativity among their central educational values are usually more effective in supporting students' creative thinking and imagination (Besançon & Lubart, 2008; Denervaud et al., 2019). Similarly, different teaching methods described under the umbrella of "creative pedagogies" (Beghetto & Glaveanu, 2021; Cremin & Chappell, 2019) vary greatly across countries and schools within different countries. Teachers' attitudes toward creativity and their pro- or anti-creative behaviors differ as well (Huang et al., 2019). Therefore, all generalizations are problematic, yet extreme positions quickly get salient. However, as this paper argued, there is sufficient evidence contrary to this widely-popularized anti-school conviction.

As discussed above, more creative students achieve more in school, even if their intelligence and personality are controlled for. Creative skills predict school achievement longitudinally and improve learning. This relationship is reciprocal, as the cognitive training the school provides allows creativity to develop. This school effect is not only related to the basic knowledge education offers, but it also serves as a building block of creative thinking. School education is also a unique, long-term training in self-regulation and metacognition.

That being said, there are some important caveats to consider. First, schools' bureaucratic nature with their time pressure, testing, and competitiveness makes them far from ideal for creativity to flourish. In times of accountability, teachers often believe they have to choose between supporting students' creativity and preparing them for exams. Second, some, albeit by no means majority or all, creative students behave in a disruptive or simply challenging way for some teachers. And although many others fit well into everyday school functioning, the salient few might impact how creative students are perceived. Finally, creative teaching might be fun and engaging for students (M. Jankowska & Atlay, 2008), and there is some evidence that it could strengthen learning (Schacter et al., 2006). Still, however, in many cases, it might provide a cognitive load (Kirschner et al., 2006; Sweller, 2009) and de-focus students, making understanding harder rather than easier. As always, the reality is complicated, and there are no apparent answers to complex questions.

To conclude, the last two decades witnessed the growing importance of creativity for teachers, policymakers, and educational psychologists (Plucker et al., 2004). While there are still prevalent myths related to creative students' functioning in school settings, there is sufficient evidence that anti-school sentiments are poorly justified. While education should be improved and perfected, it already provides substantial support for creativity development.

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