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# Development of an Instrument to Measure Opportunities for Imagination, Creativity, and Innovation (ICI) in Schools

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## Abstract

This article describes the development of an instrument for examining schools as institutions where teaching practices and school structures provide opportunities and support for student imagination, creativity, and innovation, as well as initial comparisons using the instrument, using a sample of *n*=5020 students and *n*=268 teachers (*n*=161 classes of students nested within teachers). The three 5-item subscales show acceptable reliability across groups (.73–.90). Paired sample *t*-tests indicate that, on average, students reported significantly more opportunities for creativity as compared to imagination or innovation. There were also significant differences between actual student reports and teachers' predictions only for creativity and innovation. Students reported more opportunities for creativity and innovation than their teachers predicted. However, students' reported significantly less opportunity for imagination, creativity, and innovation than their teachers' ideals. Implications for subsequent research and practice are also discussed.

*Keywords:* Imagination, Creativity, Innovation, Schools, Measurement

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## Development of an Instrument to Measure Opportunities for Imagination, Creativity, and Innovation (ICI) in Schools

Should public schools devote special time and resources to the development of imagination, creativity and innovation (ICI)? Although most educators and policy makers would answer this question with an unequivocal "yes," an international obsession with increasing student performance on standardized assessments has made it extremely difficult to convince policy makers and educators to provide opportunities and resources to the types of instruction and that will promote these three essential ingredients to individual, social and cultural prosperity. Simply stated, ICI is imperative because it ignites the engines of our economy, culture, health care, education organizations at all levels, and all the other benefits that result when new ideas are valued and developed. Large numbers of young people are clearly capable of developing ICI skills, but it will not happen without a concerted effort and specific reward system that nurtures these talents. Schools that place a premium on developing these potentials may be those that are most likely to prepare the students who one day will transform our world. Theirs may be the students who grow up to develop miraculous cures for disease, launch new businesses and even entire industries, invent technological marvels, and contribute to the arts, sciences, and humanities in ways that will improve efficiency, effectiveness, aesthetics, and the quality of life for countless generations to come.

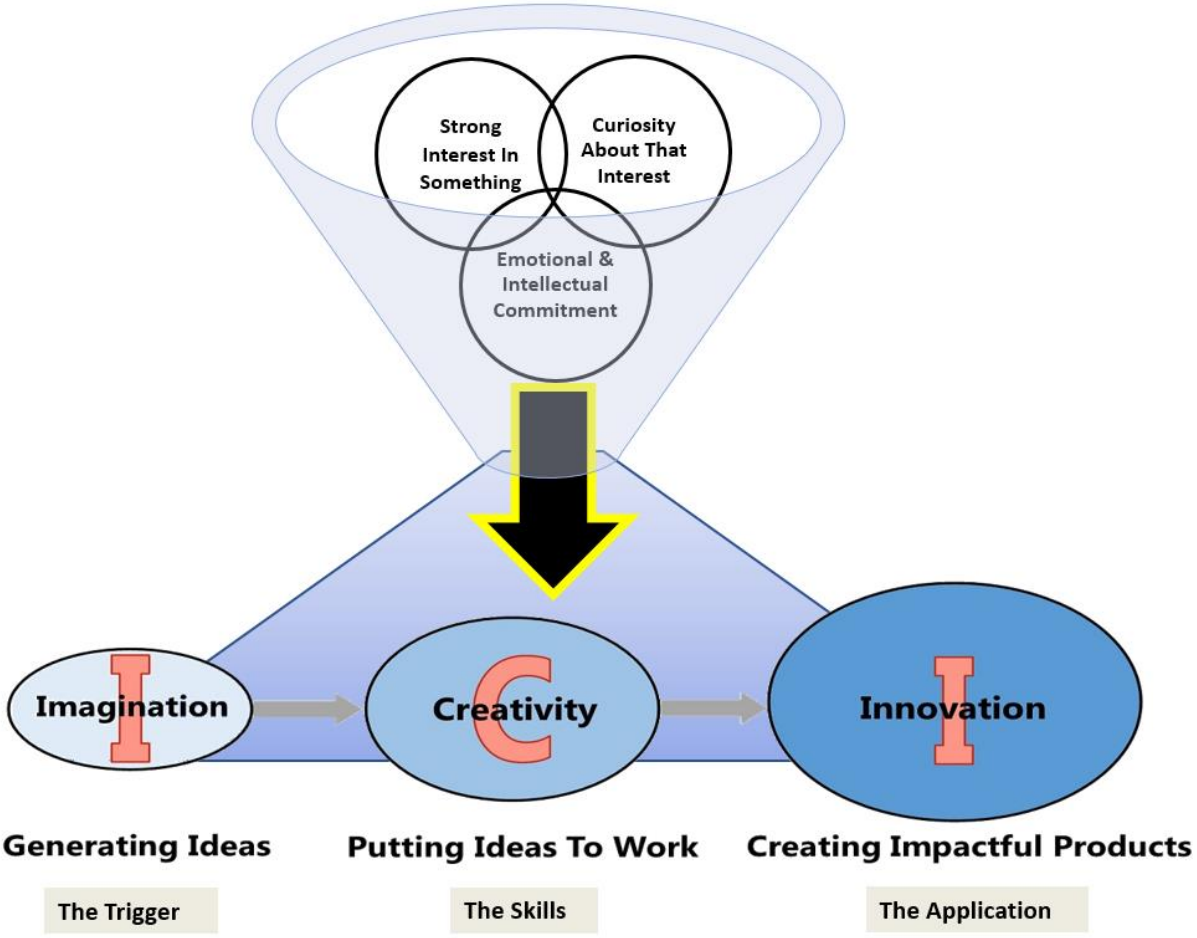
In the ongoing debate about competitiveness in the global economy, political and business leaders and researchers are beginning to realize that the powers of mind that promote ICI must be given greater attention. A small but growing number of these leaders have expressed an interest in developing ICI. In the United States, for example, lawmakers in Massachusetts began the process of developing an index in 2012, but funding has since stalled (MassBudget, 2016). Legislators in California proposed a bill in 2012 that would require a creativity and innovation index to be developed, but it did not make it into law (California Legislative Information, 2012). The state of Oklahoma developed a pilot version of a self-report survey completed by teachers to assess schools' support for creativity, but no report has been released since the pilot data was collected in February of 2016 (Creative Oklahoma, 2016). Internationally, we are seeing increased emphasis being placed on creative problem solving and starting in 2012 the Program for International Student Assessment (PISA) took an initial step toward the assessment of students' creative problem solving ability. PISA's test has been described as a measure of creative problem solving, however, the actual assessment of creativity falls somewhat short (see Beghetto, 2019) and lacks the kind of actionable information that can actually help educators monitor and support ICI.

### A Different Kind of Instrument

Although psychologists and educators have produced an overwhelming number of tests, rating scales, indices, and questionnaires to measure creativity, we are still not seeing the kinds of Imagination, Creativity, and Innovation emerging from K–12 schools that will help our nation continue to produce leaders in applied and created knowledge. Specifically, an assessment framework is needed that will help schools measure and monitor opportunities for promoting imagination (i.e., opportunities to generate new ideas), creativity (i.e., opportunities to put those ideas to work), and innovation (i.e., documenting and evaluating the impact of creative products).

This article describes the development of an instrument and process for examining schools as institutions where teaching practices and school structures provide opportunities and support for student ICI. The theoretical framework for this instrument is depicted in Figure 1.

**Figure 1**
*Theoretical Framework of the ICI Instrument*




For example, researchers have reported a positive relationship between high levels of creative productivity and the presence of clubs, organizations, and extracurricular activities that exemplify the kinds of learning environments where ICI takes place (Camp, 1990; Farb & Matjasko, 2012; Sweet, 1986). The effectiveness of such activity in extra-curricular experiences suggests that infusing more of these kinds of learning experiences into general classroom practices would also support students' development of ICI skills.

## Definitions

When developing an instrument of this type, it is important to begin with clear definitions of the constructs and factors to be measured. These definitions form the base upon which items can be built, and expert evaluation along with statistical analyses allow for determination of the reliability of the instrument and support claims of validity for certain purposes. The overarching

construct which the ICI instrument is intended to measure is *support for creative productivity* (Renzulli, 1977; 1999). Creative productivity is defined as *the development of original ideas, products, artistic expressions, and areas of knowledge that are purposefully designed to have an impact on one or more target audiences.*

The construct of support for creative productivity is represented by three related support factors in the ICI instrument: *imagination*, *creativity*, and *innovation*. These factors relate to the three types of enrichment in the Enrichment Triad Model (Renzulli, 1977), and so examples from the Triad Model may be helpful to clarify the meaning of the factors. *Imagination* is defined as engaging in possibility thinking, considering new alternatives, and generating novel ideas (Beghetto, 2008; Craft, 2014). In the Triad Model, Type I experiences are intentional opportunities for students to develop a new interest. Activities like field trips, guest speakers, and book talks might activate students' imaginations in this way. Student-teacher interactions may also support students' engagement in possibility thinking, such as when a teacher asks her students to think of how the world might be different if a historical event had turned out a different way (Beghetto, 2013).

Creativity is defined as *developing novel and task-appropriate ideas, behaviors, and products that can result in innovative outcomes* (Beghetto, 2013; Plucker et al., 2004). In the Triad Model, Type II experiences are those that train students in specific and generalizable skills. For example, teachers can teach generalizable process skills such as brainstorming and deferring judgment. Teaching specific skills, such as how to use a video editing program, also supports creativity. They can also actively encourage students to be creative as they work on school assignments.

Innovation is defined as *applying creative ideas to behaviors and product development that influence the broader socio-cultural context* (National Science Foundation, 2013). In the Triad Model, students complete Type III activities, which are creative and investigative projects that are personally meaningful to the student, have no predetermined conclusion, and which are intended to have an impact on an audience beyond the teacher. A teacher might support and encourage students' innovation by enabling them to participate in competitions or by arranging for a public showcase or critique of student work.

**Evaluating Support for ICI**

An axiom in all areas of human performance and especially in anything having to do with schooling is "that which is evaluated gets done!" An almost endless stream of articles in the school improvement literature discuss all manner of the role that data plays at district-level decision making and how districts are using data to develop policy and create customized solutions to the changes they would like to make in schools. Nowhere in this literature, however, is any mention made of ICI. Rather, an overemphasis by policy makers on a prescriptive and achievement test driven curriculum is almost synonymous with what most leaders describe as "data-based decision making." Ignoring ICI at the policy level is undoubtedly the reason for a lack of emphasis on developing these qualities in young people. Administrators and teachers are almost always evaluated on the basis of traditionally measured achievement test results; and even

in higher education we reward professors for their own creative productivity but we seldom reward them for the ICI of their students.

Changes in the global economy have resulted in a resurgence of interest in ICI at all levels of business, industry and education. A major question so far as schools are concerned is: How can we build a technically sound instrument that incorporates a school's promotion of ICI into the overall reward system by which schools are evaluated? The instrument is intended to provide a formative, guidance function for changes in schools that express an interest in promoting the infusion of these three very important human abilities into the school's services. In other words, as schools become aware of what will be evaluated as important benchmarks of ICI, they will be better able to focus their efforts and resources toward the promotion of imagination, creativity, and innovation.

The *raison d'être* of the inspired and creative-productive person is impact upon audience. The educational techniques that the ICI Instrument examines are specific types of school activity that support four characteristics of the work of people who have been recognized for their contributions to their respective fields of knowledge. These characteristics are: (a) personalization of interest (*e.g.,* students select the topics or problems rather than the teacher), (b) the use of authentic investigative and creative methodologies (*e.g.,* creative thinking and research skills), (c) addressing problems that do not have a single, predetermined correct answer and (d) which are designed to have an impact on one or more intended audiences (*e.g.,* bringing ideas to fruition through publications, performances, and other product configurations). The ICI Instrument measures the extent to which these four characteristics of creative and productive people are supported in schools.

## Review of Literature

Political and educational leaders desire a valid and reliable tool for measuring the degree to which teachers support student creativity (c.f., California Legislative Information, 2012; Creative Oklahoma, 2016; MassBudget, 2016). Soh (2000, 2017) developed the Creativity Fostering Teacher Behavior Index (CFTIndex) based on Cropley's (1995) nine characteristics of teachers who foster creative behaviors. The CFTIndex is a 45-item self-report instrument that teachers complete. The ICI Instrument consists of only 15 items and is intended to be completed by both teachers and their students to enable a comparison of the two perspectives. This design pairs reflective practice with student feedback and is intended to help teachers identify areas to target in their own professional growth.

### Teaching for Creativity: Studies Including Both Teacher and Student Perspectives

Makel (2009) called the difference between the value placed on adult creative acts and the lack of support for children's creativity in schools the "creativity gap." In examinations of teachers' beliefs about creativity, researchers have reported that teachers have a generally positive view of creativity, although they have misconceptions, such as believing that creative students are generally well-behaved and that creativity is mainly relevant to the fine arts (Aljughaiman & Mowrer-Reynolds, 2005; Andilou & Murphy, 2010; Bereczki & Kárpáti, 2018;

Mullet et al., 2016). Conversely, Brandon (2019) reported that teachers listed student creative products equally across domains.

Unfortunately, researchers have not reported that creativity-friendly teachers' classroom practices actually support student creativity (Schacter et al., 2006). Rather, the researchers have consistently reported that teachers rate themselves as more supportive of creativity than do trained observers or their students (Alsahou, 2015; Belio & Urtuzuastegul, 2013; McLellan & Nicholl, 2012). This suggests that another "creativity gap" exists, between teachers' perspectives of creativity in children and their application of creative pedagogy with those same children (Beghetto & Plucker, 2006; de Souza Fleith, 2000). By measuring teachers' perceptions alongside their students', the ICI instrument may help to identify areas where professional development may be most needed. If used as a formative assessment (i.e., multiple administrations over time), it could also be used to evaluate the effectiveness of professional development in supporting student ICI.

## Method and Results

### Content Validation

For content validation, we sought input on the construct and relevance of the fifteen items that were written to measure the underlying constructs of schools' support for imagination, creativity, and innovation. We sought input from our advisory board as well as from six administrators and eighteen educators working in the field. A total of 14 construct reviewers completed the Likert rating scale for the 15 items. The five prompts that were intended to be interpreted as related to *innovation* were judged by the respondents to be measuring innovation. Three of the prompts that we intended to be interpreted as related to *creativity* and *imagination* were rated differently than expected.[4]

### Construct Validation

#### *First Pilot and Exploratory Factor Analysis*

Following content validation and revision based on expert feedback, we distributed the survey via email to teachers and administrators in cooperating school districts as well as to contacts obtained from a gifted education conference list-serve. This first pilot survey consisted of demographic questions about the respondent and his or her school, questions about extracurricular activities offered by the school, open-ended questions asking for specific examples of student ICI in the school, ratings of the level of impact student products have had, and the fifteen items that had been reviewed by content experts. Respondents rated the school on a scale of 1 (strongly disagree) to 5 (strongly agree) in a single subject area or in multiple subject areas, depending on their individual familiarity with the support provided in that subject area.

Data were cleaned of empty and incomplete responses. Responses with ratings in only one subject area were not considered incomplete, but responses which included ratings for only some of the items within a subject area (i.e., a subject area was rated only in the first few items) were considered incomplete. After this cleaning, between 244 and 349 responses remained for

[4] Data tables for Construct Validation and EFA analyses are available in online supplementary material.

each item. We conducted a factor analysis for responses in each subject area. During analysis, cases were excluded listwise by subject area, so that all complete responses within each subject area would contribute to the factor analysis of that subject area.

We conducted exploratory factor analyses in SPSS using Principal Axis Factoring with Direct Oblimin Rotation to differentiate the factors as much as possible. For the initial extraction, 14 factors were identified, with three factors having noticeably higher eigenvalues than the rest. We next conducted an exploratory factor analysis of each subject area separately. In the second set of EFAs, the items loaded onto 2 factors in each subject area except Art. This suggests that the initial 14-factor solution was differentiating by subject area rather than by latent factors (i.e., each item loaded as a separate factor). Because items 1–10 and 11–15 consistently loaded together regardless of subject area (except Arts), and based on feedback from participants that the instrument was too long, we removed the subject-area distinctions for the second pilot. We also tested a 3-factor solution with each subject area, excluding Arts, to test whether the data would support the hypothesized structure. The 3-factor solution was deemed acceptable because the items that loaded on each factor almost all followed the initially theorized structure.

### *Second Pilot and Confirmatory Factor Analysis*

#### Instrument

For the second pilot, we removed the sections on Level of Impact and Extracurricular Activities and added open-ended items requesting examples of students' creative productive activity and specific school supports for ICI. The revised teacher instrument prompted educators to respond to each of the 15 ICI items twice: once to indicate their ideal of the level of emphasis the school would place on those (Ideal), and once to indicate the level of emphasis they predicted that students would rate the school as having (Predict; Appendix A). We also wrote parallel items to create a student version of the survey. They were constructed to present the same ideas as the original items, but with language that would be comprehensible to students as young as 3rd grade (Appendix B). Students and their teachers both entered the teacher's name, which was recoded to a matching ID during data cleaning.

#### Sample

Districts were recruited for the study by contacting central office administrators who had previously expressed an interest in the topic of creativity at school. The four school districts whose leaders elected to participate in the study are located in three states in the southeastern and southwestern United States. The districts serve between 27,000 and 104,000 students in rural, suburban, and urban settings (U.S. Department of Education, 2018). The research team provided recruitment letters, which the district contacts shared with school administrators and teachers to encourage them to participate. District contacts independently determined whether to send the recruitment materials to all schools and teachers or to specific schools and teachers.

Each teacher who received the invitation to participate was also asked to facilitate their students' participation by distributing and collecting parental permission forms for their students, by arranging for student access to computers or tablets to take the survey, and by reading a set of scripted instructions to introduce the survey to their students at the time of administration. The number of teachers and students per responding school varied by district and by school, with a total of 292 educators or administrators and 5020 students responding (Table 1). The full sample

of each group was used in the single-group analyses. In the analyses of teacher-student relationships, only matched scores were considered (*n*=163 teachers matched to *n*=3345 students).

**Table 1**

*Participant Demographics*

| District[a] | *N* Schools | *N* Educators | *N* Students |
|---|---|---|---|
| A | 21 | 64/30 | 884 |
| B | 5 | 32/62 | 392 |
| C | 5 | 34/52 | 421 |
| D | 10 | 177/147 | 3278 |
| Did Not Report | | | 3 |
| Total | 41 | 307/291 | 5020 |
| | | | |
| Grade Level[b] | | | |
| 3 | | 83/57 | 942 |
| 4 | | 89/43 | 1182 |
| 5 | | 79/38 | 1253 |
| 6 | | 49/16 | 593 |
| 7 | | 38/23 | 657 |
| 8 | | 29/12 | 363 |
| | | | |
| Race | | | |
| White | | | 3001 |
| Black/African American | | | 241 |
| American Indian/Alaska Native | | | 72 |
| Asian | | | 147 |
| Native Hawaiian or Pacific Islander | | | 25 |
| Other | | | 1464 |
| | | | |
| Hispanic/Latino | | | |
| Yes | | | 1676 |
| No | | | 3253 |
| | | | |
| Gender | | | |
| Male | | | 2536 |
| Female | | | 2451 |

[a] During data cleaning and recoding for anonymous analysis, not all teachers who responded had matching student responses, and not all students had matching teacher responses. The reporting format A/B indicates the number of teachers that students identified (A) and the number of teacher responses (B).

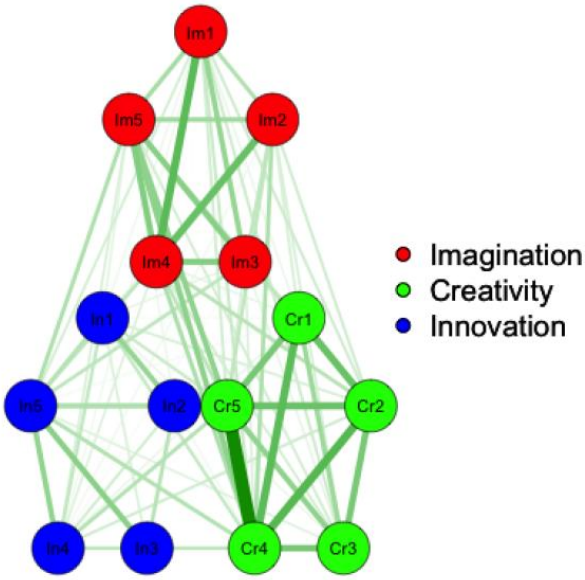
[b] 66 educators selected multiple grade levels taught. Reporting format A/B indicates the total number of teachers who selected that grade level (A) and the number of teachers who taught that grade level exclusively (B).

**Analysis**

The data for the second pilot were analyzed using confirmatory factor analyses (CFA). Prior to conducting CFAs, network analysis was used on the student sample as a visual check on inter-item connections (Figure 2).

**Figure 2**

*Network Analysis of Student Data (thicker lines represent stronger correlations)*




We examined the 3-factor CFA multiple ways using typical fit indices, and it showed good fit (Table 2; Hu & Bentler, 1999). We examined the 3-factor CFA with correlated latent factors. Then we fitted the same 3-factor model in a multilevel CFA, controlling for nesting students within classes (identified by teacher), with continued good fit.

**Table 2**

*CFA Analyses (Student Data)*

| | CFI | TLI | RMSEA | SRMR |
|---|---|---|---|---|
| Basic CFA model (3 correlated factors) | .961 | .953 | .045 | .029 |
| Modified CFA model (3 factors, 1 covariance) | .975 | .969 | .033 | .026 |
| Basic CFA model in 2-level CFA | .936 | .931 | .035 | .035 |
| Modified CFA model (3 factors, 1 covariance) | .948 | .943 | .031 | .034 |

*Note:* Typical fit indices (Hu & Bentler, 1999): CFI and TLI>.90 show acceptable fit (>.95 good fit), RMSEA and SRMR<.08 (.05) as lack of misfit.

Finally, measurement invariance was tested using students' gender. ΔCFA and ΔRMSEA near 0 indicate that the instrument measures the same constructs in the same way among male and female students (Table 3).

**Table 3**
*Students' ICI Ratings: Invariance Analysis by Gender*

| Model | CFI | TLI | RMSEA | SRMR | ΔCFI | ΔRMSEA |
|---|---|---|---|---|---|---|
| Configural | .963 | .955 | .040 | .030 | --- | --- |
| Metric | .963 | .958 | .039 | .030 | .00 | -.01 |
| Scalar | .959 | .957 | .039 | .031 | .004 | -.01 |

The same procedure was realized, twice, for teachers; once for Ideal items and once for Predict items[5]. Since one of our goals was to compare the Ideal to the Predict, we computed within-person invariance, because each teacher completed both questionnaires. The teachers' CFA fit was generally acceptable, especially given the smaller sample (Table 4).

**Table 4**
*CFA Model Fit for Teachers*

| Fit Parameter | Ideal | Predicted |
|---|---|---|
| CFI | .935 | .932 |
| TLI | .922 | .918 |
| RMSEA | .088 | .086 |
| SRMR | .045 | .047 |

Finally, we calculated latent correlations between teachers' perception of ICI (predict) and their students' perception. As both 3-factors structures of the ICI instrument were characterized by good fit, the next step consisted of a more complex analysis. We started with a two level-CFA model to estimate the fit of the model simultaneously estimating perceived imagination, creativity and innovation among teachers and their students, conservatively controlling nesting of students within classes (as represented by teachers; see Figure 3).

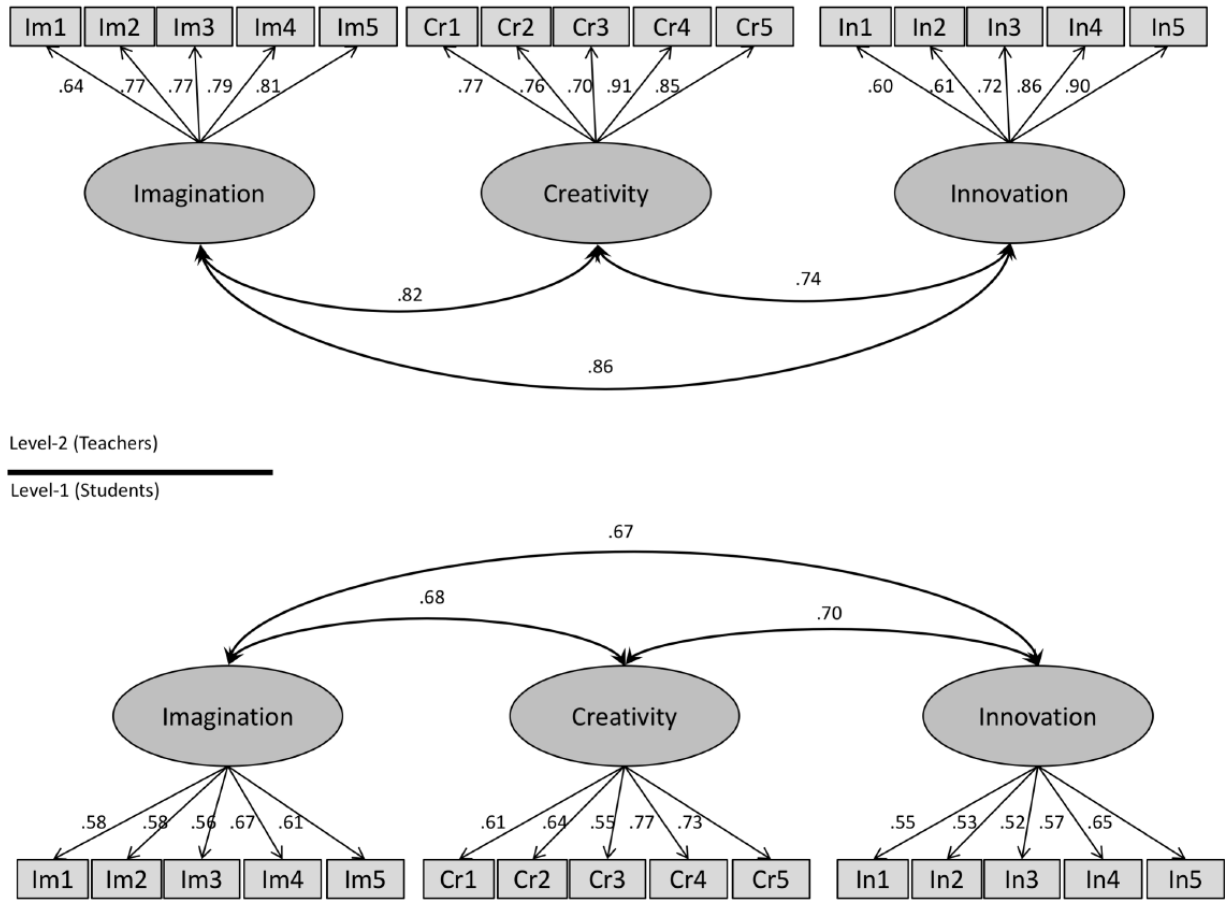
This model was characterized by a very good fit (*CFI*=.963, *TLI*=.956, *RMSEA*=.026, *SRMR*within=.027, *SRMR*between=.052). In other words, at both levels the 3-factor model seems to work well, even if modelled simultaneously.

But did teachers and students share the same perceptions of opportunities for imagination, creativity and innovation? The similar structure itself is not sufficient to answer that. Hence, this problem was analyzed in two ways: first, in a CFA controlling for nesting students within teachers and second, on an aggregated level (students' responses were averaged within classes, so all analyses were done on level-2).

[5] Preliminary CFA visualizations available as supplementary online material.

**Figure 3**

*Empty 2-Level CFA Model with both Teachers' "Predict" and Students' ICI Ratings*

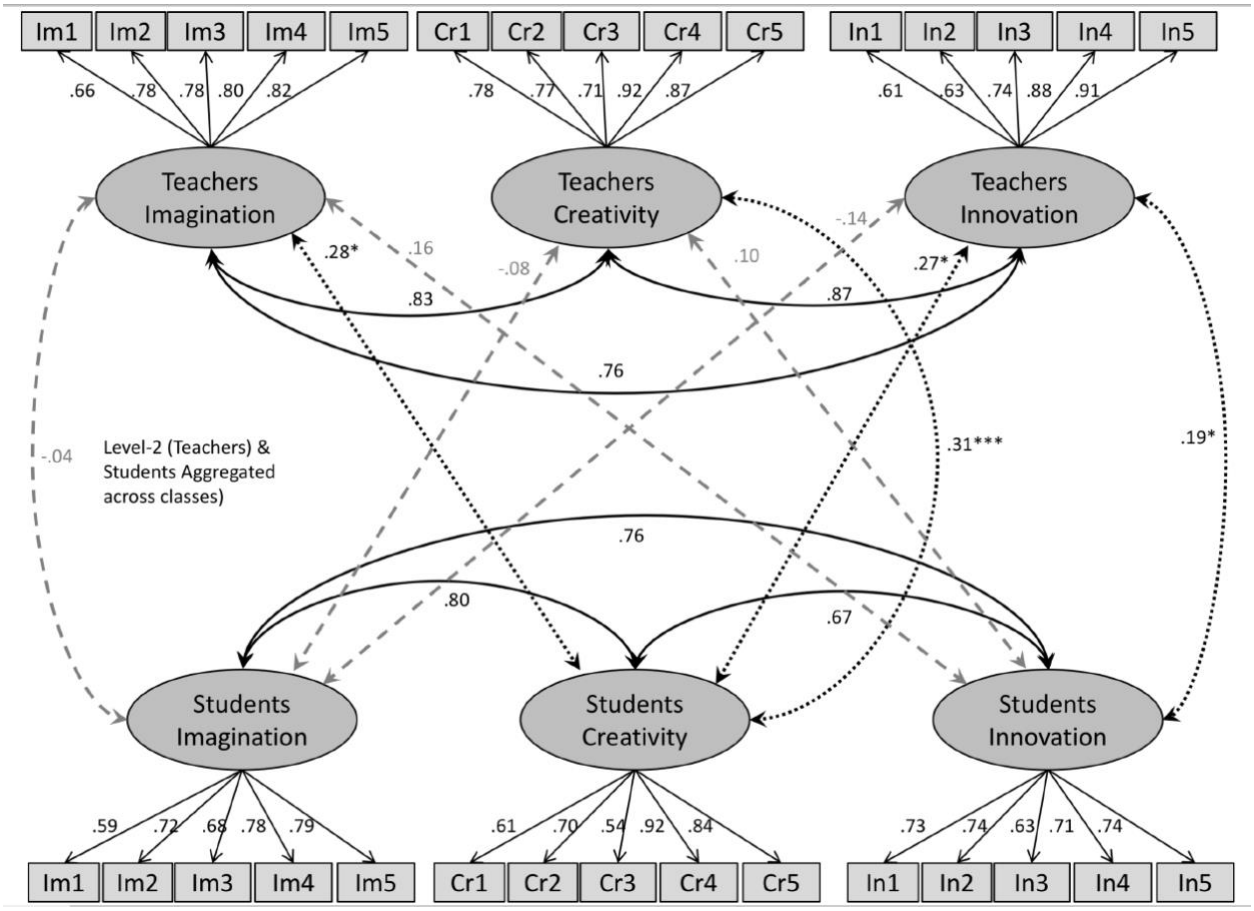



When we included correlations between latent variables from teachers' and students' levels, the 2-level model was characterized by an acceptable fit (CFI=.939, TLI=.932, RMSEA=.014, SRMR=.039), yet significantly worse than the previous, baseline 2-level model. This suggests that correlations between latent variables from teachers' and students' perceptions do not add anything to the model. The only significant, yet weak correlation (r=.095, p=.034) was observed between teachers' perception of imagination in their classroom and students' perception of creativity in the same classes. All other links were not significantly different from zero.

Given that a substantial portion of students' perception of ICI was also shared within classes, a 2nd-level analysis was conducted using aggregated students' responses within classes. The fit of this model was acceptable, although not perfect (*CFI*=.90, *TLI*=.89, *RMSEA*=.058, *SRMR*=.079). As illustrated in Figure 4, however, in this case there were some similarities between teachers' and their aggregated classes' perceptions.

**Figure 4**

*Individual-level CFA Model Estimating the Links Between Teachers' "Predict" and Students' Aggregated (i.e., Class-level) ICI Ratings*




**Within-Group Comparisons: Opportunities for Imagination, Creativity, and Innovation**

Specifically, a significant link between perceived creativity by teachers and classes ($r$=.31, $p$<.001) and significant correlation in the case of innovation ($r$=.19, $p$=.047) emerged. What's more, teachers' perceived imagination was significantly correlated with classes' perceived creativity ($r$=.28, $p$=.002).

We constructed scale scores for each of the three factors by averaging the responses to the items. All scales had acceptable or good reliability, with the teacher scales stronger than the student scales (Table 5).

Paired sample $t$-tests indicate that, on average, students reported significantly more opportunities for creativity as compared to imagination ($t$[5019]=49.16, $p$<.001, Cohen's $d$=0.69, 95% *CI*: 0.66, 0.73) or innovation ($t$[5019]=63.68, $p$<.001, Cohen's $d$=0.90, 95% *CI*: 0.87, 0.93). Additionally, teacher's ideals were significantly greater than their predictions, on average, for all three factors (imagination, $t$[267]=25.16, $p$<.001, Cohen's $d$=1.54, 95% *CI*: 1.36, 1.71], creativity, $t$[267]=22.88, $p$<.001, Cohen's $d$=1.40, 95% *CI*: 1.23, 1.57], and innovation,

*t*[267]=19.85, *p*<.001, Cohen's *d*=1.21, 95% *CI*: 1.05, 1.37]), which suggests that they tend to see room for improvement in ICI.

**Table 5**

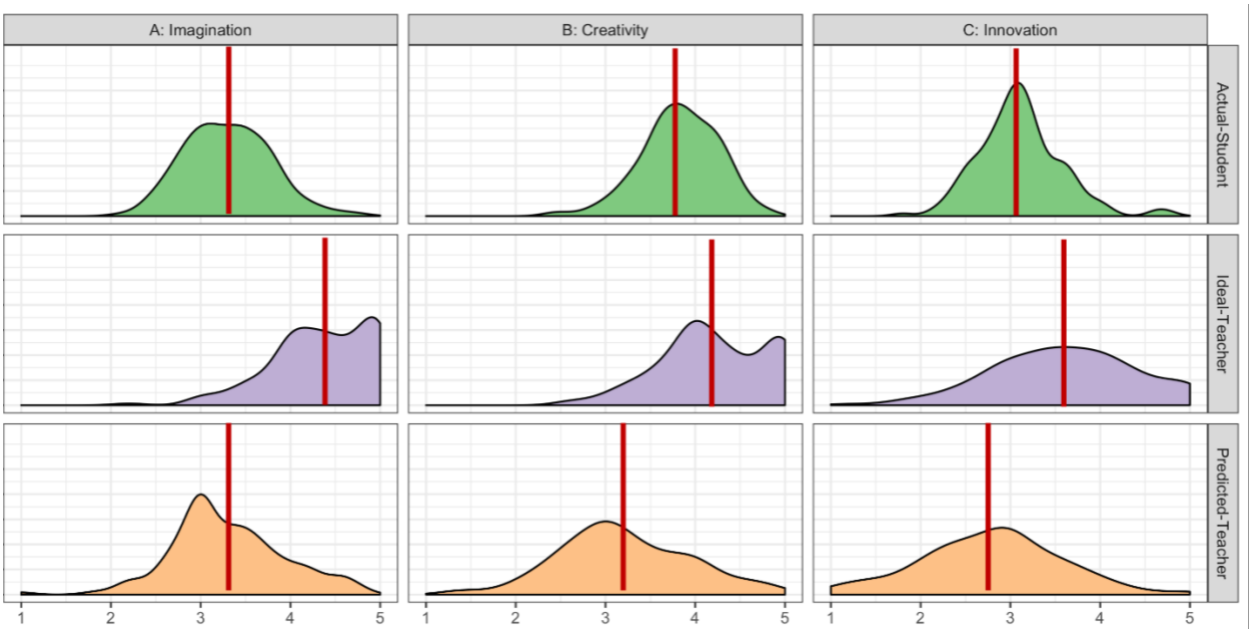
*Final Scales Metrics and Initial Comparisons*

| | | | | Teacher Instrument (*n*=268) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Student Actual (*n*=5020) | | | Ideal | | | Predicted | | |
| Scale | α | M | SD | α | M | SD | α | M | SD |
| Imagination | .77 | 3.26 | .87 | .89 | 4.34 | .58 | .87 | 3.26 | .63 |
| Creativity | .81 | 3.81 | .86 | .90 | 4.21 | .63 | .90 | 3.14 | .71 |
| Innovation | .73 | 3.04 | .91 | .84 | 3.61 | .78 | .84 | 2.75 | .74 |

Matched Teacher-Student Comparisons: Ideal, Actual, & Predicted. Next we used paired sample t tests and compared teachers' prediction of their students' ratings to their actual students' ratings (aggregate average rating by students in their class) for ICI (*n*=163 teachers matched to *n*=3345 students; Figure 5).

**Figure 5**

*Visualization of Scale Scores Demonstrating Large Effect Size of Differences Between Actual and Ideal and Between Predicted and Ideal Support for ICI (Vertical Lines Indicate Means)*




There were significant differences between actual student reports and teachers' predictions only for creativity (*t*[160]=10.12, *p*<.001, Cohen's *d*=0.80, 95% *CI*: 0.62, 0.97) and innovation (*t*[160]=4.64, *p*<.001, Cohen's *d*=0.37, 95% *CI*: 0.21, 0.53). Students reported more opportunities on average than their teachers predicted, although this was not true for all classes (see Figure 8 for a counterexample). However, students' reported significantly less opportunity for imagination (*t*[162]=-17.37, *p*<.001, Cohen's *d*=-1.36, 95% *CI*: -1.57, -1.15), creativity

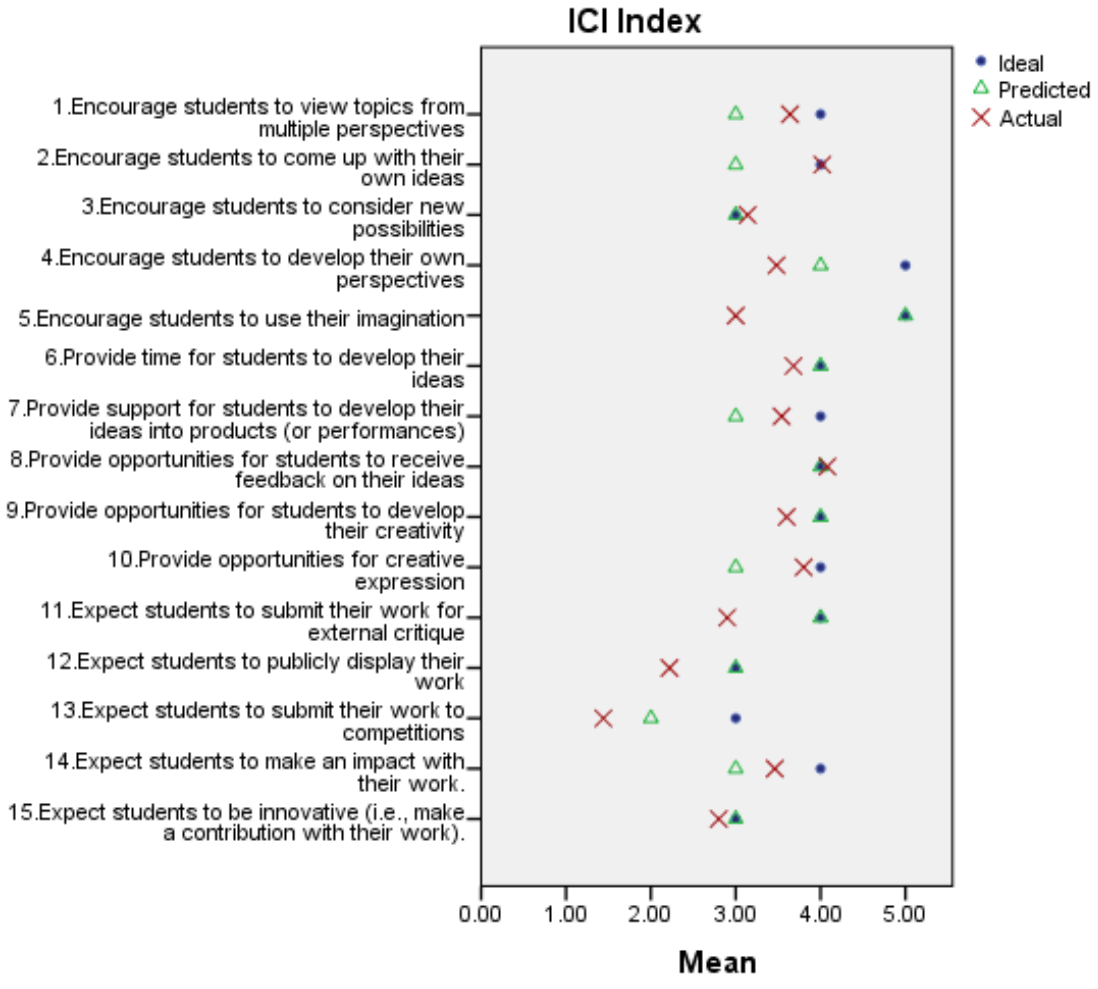
($t$[161]=-6.60, $p$<.001, Cohen's $d$=-0.52, 95% *CI*: -0.68, -0.35), and innovation ($t$[161]=-6.91, $p$<.001, Cohen's $d$=-0.54, 95% *CI*: -0,71, -0.38) on average than their teachers' ideals.

## Discussion

If we assume that the students' ratings are an accurate representation of teachers' actual practices, then this study aligns with other studies that have found teachers tend to rate themselves more highly on their support for creativity (Ideal ICI) than they actually implement in practice (Alsahou, 2015; Belio & Urtuzuastegul, 2013; McLellan & Nicholl, 2012). We believe that if teachers have a more realistic picture of actual practices, they are more likely to examine the nature and extent of their ICI instructional practices and look into resources and professional development opportunities that will bring their teaching practices more in line with ratings based on student feedback. In the interest of making our research practically applicable, we developed a simple, graphical report to assist teachers in identifying areas of strength and areas for growth related to these practices (Figure 6).

**Figure 6**

*One Teacher's ICI Index (To make the graph easy for practitioners to interpret, the mean score for each item is shown on the same 1–5 scale used to respond to the survey.)*



The process that we have developed should be viewed as a formative assessment of classroom practices rather than an evaluation of teacher competency. External forces such as rigid standards, highly prescriptive curriculum, over emphasis on achievement test preparation, and a lack of training in ICI teaching strategies have prevented teachers from engaging in the kinds of teaching that promote imagination, creativity, and innovation (Cheng, 2010; Eason et al., 2009; Hansen & Feldhusen, 1994; Jones & Egley, 2004; Olivant, 2015).

Things are changing at all levels in the wider world of work, and now these are exactly the kinds of skills that control access to opportunity and advancement in today's rapidly changing and highly competitive job market, especially for high level professional positions (Adobe, 2014; Renzulli, 2020). Imagination, creativity, and innovation are the kinds of skills that present-day employers are seeking, and they are now being viewed as equal to and sometimes even more valuable than just getting a high score on standardized tests. These so-called "soft skills" are not as easily quantified as reading and math test scores, but they can be recognized by teacher observations, rating scales, and how students react in performance-based assessment situations. History is replete with men and women who were not superstars in traditional school learning environments but who made notable contributions to their respective areas of interest and strengths when given opportunities and support. Nothing will change the predominant emphasis of achievement test scores on the state report cards that departments of education use to evaluate schools; however, the simple addition of some information about the degree to which schools are promoting ICI will assist in encouraging these important 21st Skills. We also believe that additional research using populations with various demographics is necessary to explore the extent to which an instrument such as the one we developed can help to uncover further details about the value of promoting ICI in our schools. Finally, follow-up data and a data base collection of evaluated student contributions by users of ICI should provide guidance about needed further research and professional development procedures. The only thing we are certain about is "that which is evaluated gets done," and therefore if schools, stare departments, and ministries of education want to promote more imagination, creativity, and innovation in their education programs they must have a valid and reliable instrument at hand.

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## APPENDIX A
## Student survey items

Think about how often your teachers do each of the following things.
Select never, rarely, sometimes, most of the time, or almost always.

1. My teachers ask me to look at things in different ways.
2. My teachers ask me to come up with my own ideas.
3. My teachers ask me to think of things that might happen.
4. My teachers ask me to think of my own way to look at things.
5. My teachers ask me to imagine things.
6. My teachers give me time to develop my ideas.
7. My teachers support me when I want to develop my ideas into products (or performances).
8. My teachers give me feedback on my ideas.
9. My teachers give me a chance to develop my creativity.
10. My teachers give me a chance to express my creativity.
11. My teachers want me to show my projects to people who know about the topic.
12. My teachers want me to show my projects to people other than classmates, teachers, and family.
13. My teachers want me to enter my work into competitions.
14. My teachers want me to share my work with others.
15. My teachers want me to add something to the world with my work.

Open-Response Items:

16. Think of some things you have done during this school year, at school or with a school group, that you are proud of doing. Maybe you made something, put on a performance, or provided a service to help others. It may have been something you did by yourself or something you did with others.
    Briefly describe what it is below:
17. Is there anything else you would like to share? Enter it here.

## APPENDIX B
## Teacher survey items

The following prompts describe different ways a school might support imagination, creativity, and innovation in its students. For each prompt, consider what you consider to be the **ideal** degree of emphasis as well as what you **predict** students will report as the degree of emphasis the school places on each.

For each prompt, the following scale is provided:
Never – Rarely – Sometimes – Most of the Time – Almost Always

1. Encourages students to view topics from multiple perspectives
2. Encourages students to come up with their own ideas
3. Encourages students to consider new possibilities
4. Encourages students to develop their own perspectives
5. Encourages students to use their imagination
6. Provides time for students to develop their ideas
7. Provides support for students to develop their ideas into products (or performances)
8. Provides opportunities for students to receive feedback on their ideas
9. Provides opportunities for students to develop their creativity
10. Provides opportunities for creative expression
11. Expects students to submit their work for external critique
12. Expects students to publicly display their work
13. Expects students to submit their work to competitions
14. Expects students to make an impact with their work
15. Expects students to be innovative (i.e., make a contribution with their work).

Open-Response Items:

16. In the box below, describe a product, performance, or service completed by students at your school that is a point of pride. You may describe more than one.
17. In the box below, describe the supports that your school provides for students to develop products, put on performances, or provide services to others.
18. Enter any additional thoughts or comments here.