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Articles

Determinants and Implications for Creativity Education in Korea : Policy Tools, Street-level Administration, and Implementation Conditions

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The success of a policy depends on whether policy tool is appropriately chosen and how they work well to effective policy implementation in complex policy environments. However, only a handful of empirical studies attempt to test the effects of policy tools. This study uses a hierarchical regression analysis with data from both administrative data and survey data gathered from 167 lower secondary school teachers in Korea to examine the effect of key policy tools. The results are as followings: for grant, subject classroom facility grant has statistically significant positive relationships with CE, whereas CE Model School grant does not; for regulation, textbook regulation has statistically significant positive relationships with CE, whereas fewer subjects per a semester regulation does not.

Policies are made and pursue their goals through policy tools (Capano & Howlett, 2020; Choi, 2006; Chun, 2007) and the way specific policy tools are set together matters for policy effect (Capano et al., 2019). The success of a policy depends on whether a policy tool is appropriately chosen and how they work well to effective policy implementation in complex policy environments (Peters & van Nispen, 1998). However, there are few studies on how policy tools work and how they make an effect in diverse and complex policy environments.

This study aims to investigate how policy tools work and how they make effects, the questions which Salamon (1981) pointed out to be answered to by policy tool research and have been among fundamental issues unknown (Capano & Howlett, 2020) by analysing the effect of grants and regulation used in Creativity Education (hereinafter referred to as CE) policy in South Korea.

Grant and regulation are the policy tools most used to accomplish goals in many policy fields. Street-level administration variables (e.g. conformity to CE in School management, teacher expertise for CE) and environmental variables (e.g. college entrance examination system, school district, class size, parental support) which are known to affect educational policy effect are included into the policy analysis model.

CE policy has been one of the key education policies in many countries since the 1990's. Korea too introduced CE policy to foster creative talent throughout the elementary and secondary schools since 2010.

CE has more special policy significance for Korean education. South Korean education has been praised for both its role in economic development and its comparatively high international rankings (Guo, 2005, p. 75; OECD, 2009, 2012, 2015, 2018; Song, 2013). However, there have been growing worries that the education system in which one-sided lectures by teacher and student assessment by multiple choice questions are prevalent, even hinders the development of the students' creativity which has been touted as the most important quality in the world of an unprecedented technological revolution that is transforming economies, government, and societies in complex and unpredictable ways (Barron, 1988, p. 77; Board of Audit and Inspection of Korea, 2013; Craft, 2003; OECD, 2019).

Policy Tools and Policy Effect

The link between policies' content (policy tools) and their outcomes is indirect and limited (Koontz & Thomas, 2012) and policy effect is driven by many factors (e.g. the percentage of public spending, the socio-economic cultural background of families, external and internal shocks, and financial retrenchments matter). However, the main way governments can steer their policy systems is to adopt specific sets of policy tools to address the behaviour of specific targets and beneficiaries. Thus, the policy tools that governments design and operate could help to readdress the way that policies work and succeed.

Various policy tools such as grants, legislation, regulation, guidelines, standards, procedures, loan guarantees, direct loans, tax expenditure, training, education, public ownership, information have been used in government ac-

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tions (Capano & Howlett, 2020; Hood & Helen, 2007; Salamon, 2002).

Policy tools, in previous researches, are identified as purposefully designed techniques or means used by the government or similar public actors, and finally aimed at achieving policy goals or solving collective problems (Chun, 2007). Helgøy and Homme (2006, p. 142) identifies three distinctive categories of policy tools: economic tools such as grants involve either the allocation or withdrawal of material resources, whether in cash or in kind; regulations are rules and directives imposed by authorities to mandate behavior in accordance with public policy; lastly, information can influence behavioral change through the transfer of knowledge, the communication of reasoned argument, and persuasion. Recently, various policy tools such as technology platforms with volatility, uncertainty, complexity, ambiguity of public administration environment under the Fourth Industrial Revolution and democratization are emerging (European Commission, 2017; OECD, 2017, 2019; Proskuryakova et al., 2017; Zoleta, 2018).

Policy tools have been the subject of research throughout the history of the policy sciences (Capano & Howlett, 2020). The study of the field dates back to Lowi and others who developed many typologies and theories on the subject in the period 1950–1980 as well as works such Salamon (2002), Linder & Peters (1989), Peters & van Nispen (1998), Schneider & Ingram (1997), and Lascoumes & Le Galès (2007) in the era since then. Central to all these studies is the need for a clearer understanding not only of individual policy tools but what impact this policy tool has on the effectiveness of policies when implemented, and how it evolves and changes over time (Gunningham et al., 1998; Rogge & Reichardt, 2016).

Many fundamental issues remain unknown or understudied and there are key elements concerning individual policy tools and policy mixes which require further investigation (Capano & Howlett, 2020). Capano and Howlett (2020) suggests a list of 14 issues based on the reviews of recent litera/ tures (Acciai & Capano, 2018; Howlett, 2019; Vargas & Restrepo, 2019) and on their long-lasting research activities around policy tools and divides them into four clusters. These clusters are defined by the followings: (a) problems with understanding instrument and mix dynamics, (b) under-examined behavioral issues around policy tools in general and more specifically, (c) measurement and methodological issues, and (d) a variety of issues related to how policy implementation affects tool deployment and use and, subsequently, policy success or failure.

Governments generate, implement, and evaluate policy options through policy tools (Capano & Howlett, 2020). The success of a policy depends on whether a policy tool is appropriately chosen, is effectively implemented in complex policy environments, and how well it works towards the goal (Peters & van Nispen, 1998).

Peters (2005) emphasizes that if we can systematically explain which policy tools are superior to other policy tools and why they are more successful at resolving specific policy issues than other policy tools, it will greatly help to policy success as well as decision-making of government. However, our causal knowledge about policy tools is not accumulated enough to actually help the choice of tools. In contrast, Bressers and Klok (1988) and Le Galès (2016) highlight that effect of a policy depends on how it is designed to work well to effective policy implementation rather than there is an superior tool in a policy.

While grants and regulation have been the most used policy tools in many fields, particularly in education policy (Craft, 2003, p. 121), there have been few studies on how policy tools work and how they make effects complex policy environments.

A grant is a payment from a donor government to a recipient organization or an individual with the aim of either stimulating or supporting some sort of service or activity by the recipient (Bean & Conlan, 2002, p. 341). Through this device, a governmental agency (the grantor) participates in the provision of a service, while leaving to another entity (the grantee) the task of actual practices.

Numerous government-funded education projects are formulated and implemented by related central ministries and agencies. Funding is necessary to motivate and empower individuals to take actions (Helgøy & Homme, 2006, p. 143).

Regulation, one of policy tools most used with grants, has been a central and essential function of government (Mitnick & Getz, 2019). There is a remarkable absence of explicit definitions of the concept of regulation and the scope is vast. Regulation can be understood as an umbrella term for "all mechanisms of social control, by whosoever exercised, while it can be understood narrowly as “authoritative rules” usually set by governmental institutions (Jordana & Levi-Faur, 2004, p. 3). Regulation can be defined more narrowly as the public administrative policing of a private activity with respect to a rule prescribed in the public interest.[1] Helgøy and Homme (2006, p. 143) identifies regulation as policy tool as rules and directives imposed by authorities to mandate behavior in accordance with public policy.

In most countries, the elementary and secondary school curriculum is a kind of regulation because it is a rule and directive mandatory for all school and related actors including teachers, students, parents, and so on. In Korea, the secondary school curriculum is designed to ensure nationwide uniformity of content and standards of education, legislated by the central government, and applied to all school and students(Elementary and Secondary Education Curriculum Law Article 23; Elementary and Secondary Education Cur-

1 Regulation that is formally rationalized as the public interest may in fact be the result of a societal group obtaining government protection that steers benefits to the members of the group (Mitnick & Getz, 2019, p. 2). Thus, the existence of a public interest rationale for regulation does not necessarily mean that the primary actual purpose of the regulation is to provide general public benefit. Government regulation can be a valuable prize that reduces competition, guarantees enhanced incomes, discriminates against open participation in activities, and so on. Indeed, one of the classic reasons for the existence of government is to provide a legitimate mechanism for the coercive resolution of disputes.

riculum Public Notice)

Creativity Education Policy in Korea

From the last decade of the 20th century onward, there have been an increasing number of global reforms of education. Through these reforms, creativity has been touted as the most important quality for the 21st century and has become a growing interest area within education circles as well as wider society (Barron, 1988, p. 77; Craft, 2003; Ripple, 1989). While creativity is a heterogeneous word in educational parlance,[2] CE policy has been introduced in many countries in response to the global economic environment (Craft, 2003, p. 115; National Advisory Committee on Creative and Cultural education, 1999; Nicholl & McLellan, 2008; Stronach, 2010; Woods et al., 1997).

Koran Ministry of Education (hereinafter referred to as MOE) introduced CE policy to foster creative talent of students throughout the elementary and secondary schools in 2010, which was a presidential campaign promise. The documented aims of CE policy are to stimulate the creativity of students by introducing teaching and learning methods such as discussion, experimentation, and presentations. Another goal of CE policy is to introduce more comprehensive student assessment including problem solving capability of student instead of rote memorization and multiple-choice tests (Korean Ministry of Education, 2010). Teachers were encouraged to use CE methods to develop student's creativity (Board of Audit and Inspection of Korea, 2013; Korean Ministry of Education, 2010, 2011a).

As such, the implementation goal of CE policy is to transform the curriculum from uniform to specialized, teaching methods from lecture-based instruction to higher engagement activities, student assessment from multiple choice questions to comprehensive evaluation which measure creative problem solving capability, focus of education from entering a top-ranking collage to fostering creative-thinking. The policy effect variables in this research, based on Korean CE policy goals, are three of use of CE teaching methods, comprehensive assessment of student, and stimulating student's creativity.

The government-funded project for CE includes the CE Model School grant and subject classroom facility grant. MOE selected some schools as CE Model Schools for these schools to develop CE more in school and introduce the experiences to other schools. The total budget of CE Model School program is $4 million with $20,000 paid to each school. CE Model School is supposed to spend half of their grant on CE program development or experiential activities for CE, and the other half on event activities to introduce CE experiences to other schools.

A subject classroom facility grant is intended to support remodeling classroom by a subject. The total budget is $ 200 million and the number of granted schools was 1,400 in 2012. $300,000 to $700,000 was paid to each school in proportion to the number of classrooms remodeled.

Regulations in CE policy include conformity to CE of textbook and fewer subjects per a semester. CE is fundamentally different from previous education, which focused on delivering knowledge, and changes in contents and methods of education were required. Especially, there had been concerns that the composition and content of textbook was too excessive for teacher to use CE teaching methods such as discussion, experimentation, and presentations in class (Korean Ministry of Education, 2010).

Fewer subjects per a semester is to reduce the number of subjects to deepen the study of each individual subject in a semester. All schools follow the national curriculum though a law regulates that a school could voluntarily organize which subjects are learned if the total class time by law is met (Korean Elementary and Secondary Education Act Article 23).[3]

Hypothesis

This research identifies policy effects as a function of three sets of variables; policy tools include CE Model School grant, subject classroom facility grant, conformity to CE in textbook, and fewer subjects per a semester regulation; street-level administration includes conformity to CE in school curriculum management and teacher expertise for CE which are included in individual or school level with parental support for CE; lastly, implementation conditions includes subject relevance to college entrance examination, class size, and school location which are included in national or regional level.

Independent Variables: Policy Tools

Government-funded projects vary in terms of their time span, budget size, applied subjects each of which performs differently (Craft, 2003). A federal grant could be a useful tool as it expands the use of educational technology, bolsters curriculum and staff development, and provides seed funding for local improvement initiatives, though some research have found that the scales of improvement by grants are modest at best and the influences are muted (Brehm & Gates, 1997; Knapp, 1987; Riccucci, 2005). The following grants policy tool hypotheses guide this empirical investigation.

> *Hypothesis 1.1: A teacher who works in a school with CE Model School grant has higher effect than a teacher who does not.*

> *Hypothesis 1.2: A teacher who works in a school with sub-*

2 Politicians and economists would use the term instrumentally by binding it to the future needs of the workforce, while romantic individualists would return us to a naive bygone age of authentic self-expression (Gibson, 2005, p. 148).

3 Article 23 (Curricula, etc.) (1) Schools shall operate curricula. (2) The Minister of Education shall determine basic matters on standards and details of the curricula referred to in paragraph (1), and the Superintendent of an Office of Education may determine the standards and details thereof according to actual circumstances of a region within the scope of the curricula determined by the Minister of Education. (3) Subjects taught at schools shall be prescribed by Presidential Decree.

> *ject classroom facility grant has higher effect a teacher who does not.*

National curriculum has been one of the key policy tools in education reform to foster creativity and a key factor for CE policy success (Craft, 2003, p. 115). Because using CE teaching and learning methods in class is impossible with a fixed and compulsory curriculum and too much textbook composition and content (Korean Ministry of Education, 2009).

Fewer subjects per a semester regulation has been found to produce better outcomes such as student grades improvement, increasing number of students on the honour roll than traditional scheduling in some research (Edwards, 1995; Eineder & Bishop, 1997; Lewis et al., 2005; Queen et al., 1997; Thomas & O'Connell, 1997).

Less textbook composition and content and fewer subjects per a semester are positively associated with more use of CE teaching methods, more comprehensive assessment of student, and more student's creativity (Lewis et al., 2005; Weller & McLeskey, 2000). The following hypotheses guide this empirical investigation.

> *Hypothesis 1.3: The higher the extent that a teacher thinks the composition and content of textbook is appropriate for CE is, the higher effect is.*

> *Hypothesis 1.4: A teacher under a school with fewer subjects per a semester program has higher effect than a teacher under a school without it.*

Control Variables: Street-level Administration and Implementation conditions

Many researches have showed the factors associated with street-level administration affect policy effect. Lynn et al. (2000, p. 235) emphasizes the street-level administration and Meier and O'Toole have provided the findings that the change at the service-delivery level is heavily dependent on street-level administration (Ewalt & Jennings, 2004).

Policy effect is expected to be a function of how successfully management follows through on policy goals. As Goggin et al. (1990, p. 130) put it, no matter how clear the policy message is, no matter how high the level of capacity of a given state is, and despite an appropriate formal organizational composition, skilful and committed program management seems important for policy success. Meier et al. (2004, p. 31) found that managerial influence cades through the governance system and has both direct and indirect effects on educational achievement of Latino students in Texas schools. There are my research to reinforce the basic point that management matters (Boyne, 2003; Brewer, 2005; Im & Lee, 2012; N. Kim & Cho, 2014; N. Kim & Hong, 2008; Moynihan & Pandey, 2004; Nicholson-Crotty & O'Toole, 2004).

> *Hypothesis 2.1: The more confirmative to CE school curriculum management is, the higher policy effect is.*

Lipsky (1980) has emphasized the impact of street-level bureaucrats such as teachers, police officers, social workers on the achievement of policy goals. The actions of street-level bureaucrats may diverge from the stated and intended goals of policy, which can result in policy failure or unintended results. O'Toole (2000) argues that the reality of policy implementation stands just as much in need now of valid and usable knowledge as ever. The translation of higher level goals into street-level actions is subject to a variety of influences, some of which conflict each other. These range from the extent of political support (Keiser & Soss, 1998), organizational arrangements (Hill, 1974), the administrative emphasis of policy goals (Ewalt & Jennings, 2004; Riccucci, 2005), human resource capacity (Winter, 1986), managerial supervision (Brehm & Gates, 1997; Brewer, 2005; Riccucci, 2005), and others.

These explanations are common in all policy areas, but they are particularly relevant in education policy and welfare policy. This is because the impact of variables associated with street-level administration and implementation conditions on the achievement of the policy goals are more important in these policies than in other policies (J. H. Kim, 2014; K. H. Kim, 2013).

Implementation research has given attention to implementers. More than three decades have passed since Lipsky's (1980) seminal research on street-level bureaucracy, and recent conceptual and empirical research continues to explore critically important questions of this unique type of public servant (Brodkin, 2011; Maynard-Moody & Musheno, 2012; Oberfield, 2010; Resh & Pitts, 2013). Given the key role of frontline workers in policy implementation, continued research is necessary to understand better how policies are actually executed (Bovens & Zouridis, 2002; Hill, 1974; Lipsky, 1980; Maynard-Moody & Musheno, 2012; Riccucci, 2005).

Teacher, a kind of street-level bureaucrat, is expected to be the most strongly associated with education policy effect (OECD, 2011). Whitehurst et al. (2013) which analysed 10 years of data involving all public school in Florida and North Carolina shows that the effect of teachers is about seven times larger than that of school districts with the effect of school management about as twice as that of school districts. Also many research findings show that for street-level bureaucrat, including teacher, expertise is strongly associated with policy effect (Toh et al., 1996). In other words, the actual provision of services and the imposition of mandates on clients begin with expertise of the implementers (Ewalt & Jennings, 2004).

What characteristics of teachers matter? Toh et al. (1996) argues that teacher expertise is an important determinant in the pursuit of educational excellence. Meyers and Vorsanger (2003) argues that the expertise of a street-level bureaucrat determines the action in implementing policy. This basic observation has been born out in studies of street-level bureaucrat' role in implementing policy programs (Meyers et al., 1998) as well as in a ethnographic study by Maynard-Moody and Musheno (2012) of how cops, teachers, and counsellors view their roles. The following hypothesis is thus proposed.

> *Hypothesis 2.2: The higher a teacher's CE expertise is, the higher the policy effect is.*

A particular governance arrangement is embedded in a wider social, fiscal, and political context (J. Lee & Choi, 2015; Lynn et al., 2000). Implementation conditions are so-

cioeconomic and political features that are inherent to the context of policy implementation. Subject relevance to college entrance examination, school location, class size, and parent's support for CE are among implementation conditions which have impact on CE policy effect.

First, subject relevance to college entrance examination has impact on the recognition and behaviour of all actors related with education policy in Korea (Seth, 2002; Woo, 2017). The higher proportion in the college entrance examination a subject has, the more teachers concentrate on training for entrance examination mostly associated with multiple choice questions, not using CE methods in class. The following hypothesis is proposed.

> *Hypothesis 3.1: The lower the score rate of a subject is in the college entrance examination, the higher policy effect is.*

Second, the school location could have impact on CE policy effect. Cross-sectional evidence reveals a sizeable rural–urban gap in educational outcomes across a wide range of countries (Maarseveen, 2020). The following hypothesis is proposed. However, there could be rarely difference of CE policy effect between rural and urban in Korea, because MOE plays a central role in all aspects of decision of curriculum, finances, and human resources (Seth, 2002; Sorensen, 1994).

> *Hypothesis 3.2: Urban schools have higher CE policy effect than rural schools.*

Third, class size often is put on as an easy representative statistic to monitor a measure of educational quality. Some teachers and parents presume that students will learn more in smaller classes because of increased opportunities to receive individualized instruction from teacher (Chingos, 2013, p. 413). Many researchers have demonstrated that smaller classes increase educational effect such as attending school, school choice, degree completion, and so on (Dynarski et al., 2013). Therefore, following hypothesis guides our empirical investigation. Yet, a large body of research on the r studies is disappointingly small and does not offer guidance as to the optimal class size overall, much less for specific grades, subjects, or populations (Chingos, 2013, p. 412).

> *Hypothesis 3.3: The smaller class size is, the higher performance is.*

Lastly, parents, the clients of CE policy, could be deeply associated with CE effect. Client characteristics may mitigate or increase policy effect (Ewalt & Jennings, 2004, p. 451). In many policy areas, support from key stakeholders is critical for effective policy implementation (Imperial, 2005). Key stakeholders have strong impact on policy effect (N. Kim & Cho, 2014). Whitehurst et al. (2013) argues that parents' characteristics may have four to eight times the impact on student achievement compared with teacher. The following hypothesis is proposed.

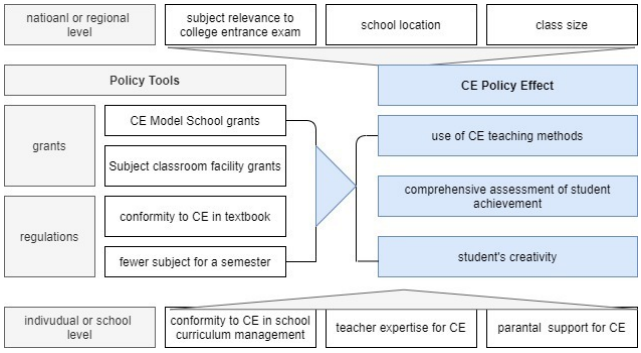

Figure 1. Policy Tools Effect

> *Hypothesis 3.4: The higher parent's support for CE is, the higher effect is.*

Methods

Analysis model of CE policy effect in this research consists of two levels of individual or school level and regional or national level (see figure 1). CE policy is implemented based on various schools and regions, students within a specific school who have individual characteristics, but they could share similar characteristics. Likewise, schools have unique characteristics for each individual, but because they share similar characteristics within a specific region, measurement variance such as within-subject variance and between-subject variance can exist at the same time.

Hierarchical regression analysis is used considering the characteristics of the analysis model in which analysis units of different levels are included.[4] Hierarchical regression analysis is often used to evaluate whether policy tools have effects such as student achievement (Ma & Klinger, 2000; Radmacher & Martin, 2001). In this research, subject relevance to college entrance examination, school location and class size are included in regional or national level. Conformity to CE in school management and teacher expertise for CE, and parental support for CE are included in individual or school level.

Data

This study uses hierarchical regression analysis with administrative data and survey data. Government official document (2011a, 2011b) supply some administrative data: CE Model School grant, Subject classroom facility grant, fewer subjects per a semester regulation, Subject relevance to college entrance examination (allocated minute number), school location (urban vs. rural).

The data used in this study official government docu-

4 Hierarchical regression analysis is a statistical method in which analysis units of different levels are included in one model so that lower-level and upper-level parameters can be estimated at the same time to be useful for evaluating the contributions of predictors above and beyond previously entered predictors, as a means of statistical control, and for examining incremental validity (H. Lee & Roh, 2013).

Table 1. Variables and Data Source

Variable	Data type	Data source
Use of CE teaching methods (%)	administrative data	F
Comprehensive assessment of student achievement (%)	administrative data	F
Student's creativity	Survey data	F
CE Model School grant (dummy)	administrative data	G
Subject classroom facility grant (dummy)	administrative data	G
Conformity to CE in the composition and content of textbook	Survey data	F
Fewer subjects per a semester regulation (dummy)	administrative data	G
Conformity to CE in school management	Survey data	F
Teacher expertise for CE	Survey data	F
Class size (student number)	administrative data	F
Subject relevance to college entrance examination (allocated minute number)	administrative data	G
Parental support for CE	Survey data	F
School location (big or middle city vs. town or village)	administrative data	G

F: fact finding research, G: Government official document

ments or the data collected from fact finding research coducted by the Audit and Inspection Research Institute in 2012. Questionnaire was sent to each teacher and the answers were collected through the Education Statistics Centre of the Korean Educational Development Institute(KEDI), a national educational statistics specialist organization.

167 lower secondary school teachers are selected randomly from lower secondary school teachers within a stratification grid defined by three variables: regional location, school district, and whether antecedent policy tools per school existed or not. The reason that teachers were selected as the target of the survey is because teachers are known how the information will be used or how it will benefit them or the organization and so motivated to be more accurate (Favero & Meier, 2013; Podsakoff et al., 2003, 2012).

One part of fact finding research supplies administrative data: Use of CE teaching methods (%); Comprehensive assessment of student achievement(%); Class size (student number). The other part supplies Survey data: Student's creativity; Conformity to CE in the composition and content of textbook; Teacher expertise for CE; and, parental support for CE. The Likert type 4-points scales are used, and 1 point means not at all, and 4 points means very so.

Also, to find out the relationship among variables and extract valid measurements for each variable, 23 people affiliated with CE policy including 2 CE policy directors of MOE, 4 principals managing CE policy in school, and 17 teachers were interviewed. The knowledge attained via interviews is used for detecting possible omitted variables, considered in the conceptualization and operationalization of variables, and used in interpreting the results of statistical testing.

Concepts and Measures

While it is unclear what creativity exactly is (Craft, 2003; Gibson, 2005), the announced goals of CE policy in Korea are comparatively clear. CE policy in Korea focuses on reducing cramming-style education in favour of teaching methods useful for fostering creativity such as discussion, experiment, and practice and comprehensive student assessments to increase student's creativity (Board of Audit and Inspection of Korea, 2013). Dependent variables includes studying the behaviour of implementers as well as studying outcomes, with this consistent with the broader shift from studying outcomes to studying the behaviour of implementers (May & Winter, 2007; Winter, 1986). Therefore, dependent variables in this research are use of CE teaching methods, comprehensive assessment of student achievement, and student's creativity.

Regarding the variables of CE effect, use of CE teaching methods is measured by the rate of the discussion, experiment, practice, and presentation of all teaching methods a teacher uses in class. The scale ranges from 0 to 100.

Comprehensive assessment of student is measured as the sum of the rate of the scores of essay-type questions (long answers) and the rate of the scores of performance assessment of total scores. The scale ranges from 0 to 100 and higher scores indicate that policy is implemented in line with CE goals.[5]

Stimulating student creativity is measured by the degree

5 In Korean lower secondary schools, student evaluation consists of paper evaluation and performance evaluation. Among them, the paper evaluation is composed of multiple choice questions, short answer questions, and essay type questions. Performance evaluation consists of practical skills, essay-answer type, quiz and student attitude.

Table 2. Summary statistics

Variable	N	Mean	S. D.	Min	Max
Use of CE teaching methods (%)	166	33.52	20.009	0.00	100.00
Comprehensive assessment of student achievement (%)	162	43.20	15.336	10	90
Stimulating student's creativity	166	2.64	.593	1.00	4.00
CE Model School grant (dummy)	167	.28	.448	0.00	1.00
Subject classroom facility grant (dummy)	167	.49	.501	0.00	1.00
Conformity to CE in textbook	167	2.61	.648	1.00	4.00
Fewer subjects per a semester regulation (dummy)	167	.81	.390	0.00	1.00
Conformity to CE in School management	167	2.866	.79121	1.30	4.00
Teacher expertise for CE	166	2.476	.5122	1.00	4.00
Parental support for CE	167	2.43	.787	1.00	4.00
Class size (student number)	158	33.31	6.249	4.00	40.00
Subject relevance to college entrance examination	161	48.57	37.011	0.00	100.00
school location (urban dummy)	167	.94	.238	.00	1.00

of consent of a teacher to the question in the survey. A 4-point Likert scale is used (1: strongly disagree, 4: strongly agree).

Regarding the variables of policy tools, CE Model School dummy, among independent variables, measures whether the school is given the CE Model School grant or not. Subject classroom facility grant dummy measures whether the school is given subject classroom facility grant or not. Fewer subjects per a semester variable captures whether the system has been introduced to school or not. Conformity to CE in textbook variable captures the extent of textbook composition and content is in conformity to CE and is measured by the degree of consent of a teacher to the question in the survey. A 4-point Likert scale is used.

Regarding the variables of street level administration, conformity to CE in school management means the extent that school curriculum is managed appropriately to nurture student's creativity and is measured by the degree of consent of a teacher to the question in the survey that my school's operation is appropriate for CE. Teacher expertise for CE is measured by the degree of consent of a teacher to the question in the survey that I have enough expertise for CE.

Regarding the variables of implementation conditions, first parental support for CE is measured by the degree of consent of a teacher to the question in the survey that parents of our school are active in supporting the school's CE. Above three variables use the Likert type 4-points scales. Second, class size measures the number of students in the respondent teacher's class.

Third, subject relevance to college entrance examination is measured by test time in minutes in the 2012 exam which reflects the importance of the subject in college entrance examination in Korea. The test time of each subject is as follows: Korean=80; Math=100; English=70; social studies=30; science=30; foreign language=40; others=0.

Fourth, school location, among the control variables in first step, is measured by a dummy variable whether the school which a teacher is affiliate with is urban or rural. Table 2 shows basic summary statistics for the independent and dependent variables.

Common Method Bias (CMB)

CMB is an error that occurs when the independent variable and the dependent variable are measured by the same measurement tool and response source (Jordan & Troth, 2019; J.-S. Lee & Lee, 2015; Park et al., 2007; Podsakoff et al., 2012; Spector, 2006; Yim, 2013). Two main detrimental effects produced from CMB is a bias of the reliability and validity of measures and a bias of the parameter estimates of the relationships between two different constructs (Podsakoff et al., 2012). Podsakoff et al. (2012) presents to make a difference in measurement method and the response source of each variable as the best way to mitigate the problem of CMB.

In this study, while most variables are measured by objective administrative data, for 5 variables, the teachers who are the respondents of the questionnaire simultaneously answered in a self-report method. 5 variables were measured by survey data gathered from 167 lower secondary school teachers.

Harman's Single Factor Test is conducted to confirm whether CMB exists.[6] The test results show that the data in this research are not affected by CMB: the factors of which Eigen Value is 1 or more are 6 and a dominant general factor is not found; also, the explanatory power of the first factor is 20.496%, less than 50% (see table 3)

Additionally, the correlation analysis results show that all correlation coefficient values are less than 0.9 and so

6 Harman's Single Factor Test evaluates whether one dominant factor exists in an unrotated solution in exploratory factor analysis (Podsakoff et al., 2003).

Table 3. Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.664	20.496	20.496	2.664	20.496	20.496
2	1.695	13.039	33.534	1.695	13.039	33.534
3	1.685	12.960	46.495	1.685	12.960	46.495
4	1.310	10.079	56.573	1.310	10.079	56.573
5	1.138	8.756	65.329	1.138	8.756	65.329
6	1.059	8.145	73.474	1.059	8.145	73.474
7	.917	7.052	80.527			
8	.763	5.869	86.396			
9	.577	4.435	90.831			
10	.471	3.622	94.454			
11	.437	3.364	97.817			
12	.284	2.183	100.000			
13	2.578E-005	.000	100.000			

1: Use of CE teaching methods (%); 2: Comprehensive assessment of student achievement (%); 3: Student's creativity; 4: CE Model School grant; 5. Subject classroom facility grant; 6: Conformity to CE in the composition and content of textbook; 7: Fewer subjects per a semester regulation; 8: Conformity to CE in School management; 9: Teacher expertise for CE; 10: Parental support for CE; 11: Class size; 12: school location; 13: Subject relevance to college entrance examination

CMB problem is not serious (see table 4).[7]

There is no multicollinearity because the tolerance is greater than 0.1 and Variance Inflation Factor (VIF) is between 1 and 10 as shown in following Table 5 Table 6, and Table 7.

Results and Discussion

Table 4, Table 5, and Table 6 report the results of hierarchical regression analysis. The effect of the variables associated with policy tools on CE effect are estimated after national or regional characteristics (subject relevance to college entrance examination, school location, class size) are controlled. Model 1 input subject relevance to college entrance examination, school location, and class size to investigate CE. Model 2 additionally inputs CE model school grants, subject classroom facility grants, CE conformity of textbooks, and regulations for fewer subjects per semester to investigate the impact on Use of CE teaching methods. In advance, table 5 reports hierarchical regression results(dependent variable=Use of CE teaching methods).

Model 1.1 and Model 1.2 fit the data well: F is 6.625 ($p < .001$) in model 1.1 and 6.787 ($p < .001$) in model 1.2. The independent variables are statistically significant in explaining the dependent variable, after input of the control variable: R^2 is 0.117 in Model 1.1 and 0.322 in Model 1.2 with R^2 increased by 0.205. Model 1.1 and model 1.2 both have a tolerance (TOL) of 0.1 or more and a VIF of less than 10, confirming that there is no problem of multicollinearity between variables.

Among the independent variables, subject classroom facility grant has a positive and significant association with use of CE teaching methods (β =0.228), whereas the coefficient for CE model school grant is not significant in model 1.2. Conformity to CE in the composition and content of textbook regulation is significantly and positively related to use of CE teaching methods (β =0.208), whereas the coefficient for fewer subjects per a semester regulation is not significant in model 1.2.

Among control variables, subject relevance to college entrance examination is significantly and negatively related to use of CE teaching methods in model 1.1 and model 1.2. This means that the higher the relevance of a subject to the entrance exam is, the less CE teaching methods is used in class. Also cconformity to CE in school curriculum management has a statistically significant effect on the use of CE teaching methods, and the direction is positive (β =0.340). This means that as conformity to CE in school curriculum management increases, use f CE teaching methods increases.

7 CMB exist when the correlation coefficient between latent variables is high (0.9 or more) (Malhotra et al., 2006; Pavlou et al., 2007).

Table 4. Correlation Analysis Results

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1												
2	-.019**	1											
3	-.011	-.019	1										
4	-.07	.051	.126	1									
5	-.048	.054	.079	.360**	1								
6	.170*	-062**	.170*	.102	.017	1							
7	-.037**	.497**	.037	-.122*	.059	-.161*	1						
8	.175*	-.016**	.175*	.325**	.249**	.490**	-0.114	1					
9	-.011	-.019	.170**	.104	.029	.169*	-0.036	.174*	1				
10	.158*	.013**	.158*	.264**	.201**	.362**	0.015	.631**	.274**	1			
11	.497**	0.114	-.019	.189*	-.206**	-.015	-0.112	-.016	-0.055	.264**	1		
12	.02	.083*	0.02	.156*	-206**	.043**	0.043	-.017	-.137	.201**	.806**	1	
13	-.062	.497**	-.037	-.07	-0.048	-.161*	-0.016	-.114	-.036	0.015	.497**	-.105	1

***p<0.001 **p<0.01 *p<0.05, The value of each number is the same as in Table 3 above.

Table 5. Hierarchical Regression Results (Dependent Variable=Use of CE teaching methods)

	Model	Unstandardized Coefficients		Standardized Coefficients	T(P)	Collinearity Statistics	
		B	S. E	Beta		Tolerance	VIF
1.1	(Constant)	44.832	8.853		5.064**		
	Subject Relevance to college entrance examination	-.171	.042	-.318	-4.085**	.969	1.032
	school location	-13.024	10.507	-.162	-1.240	.344	2.905
	Class size	.292	.414	.093	.703	.339	2.946
	F(p)			6.625***			
	R^2			.342			
	adj. R^2			.099			
1.2	(Constant)	1.895	14.300		.133		
	Subject relevance to college entrance examination	-.159	.040	-.296	-4.026***	.879	1.137
	school location	2.159	3.951	.054	.547	.487	2.055
	Class size	.302	.391	.096	.772	.307	3.256
	CE Model School grant	.569	3.696	.013	.154	.686	1.458
	Subject classroom facility grant	9.015	3.212	.228	2.807***	.721	1.387
	Appropriateness of textbook for CE	6.369	2.496	.208	2.552*	.714	1.401
	Fewer subjects per a semester regulation	-.095	3.715	-.002	-.026	.932	1.073
	Conformity to CE in school management	.320	.121	.340	4.417***	.999	1.001
	Teacher expertise for CE	1.440	2.490	.044	.579	.818	1.222
	Parental support for CE	4.388	2.476	.171	1.772	.512	1.954
	F(p)			6.787***			
	R^2			.567			
	adj. R^2			.274			

*p<.05, **p<.01, ***p<.001

Table 6 reports hierarchical regression results (dependent variable= comprehensive assessment of student achievement). Model 2.1 and Model 2.2 fit the data well: F is 2.315(p<.05) in model 2.1 and .820(p<.01) in model 1.2. The independent variables are statistically significant in explaining the dependent variable, after input of the control variable: R^2 is 0.212 in Model 2.1 and 0.263 in Model 2.2 with R^2 increased by 0.051. Model 2.1 and model 2.2 both have a tolerance (TOL) of 0.1 or more and a VIF of less than 10, confirming that there is no problem of multicollinearity between variables.

Among the independent variables, subject classroom facility grant has a positive and significant association with comprehensive assessment of student achievement (β =0.284), whereas the coefficient for CE model school grant is not significant in model 2.2. Conformity to CE in textbook regulation is significantly and positively related to use of CE teaching methods (β =0.200), whereas the coefficient for fewer subjects per a semester regulation is not significant in model 2.2.

Among control variables, subject relevance to college entrance examination is significantly and negatively related to use of CE teaching methods in model 2.1 and model 2.2. This means that the higher the relevance of a subject to the entrance exam is, the less comprehensive assessment of student achievement is used in class. Also conformity to CE in school curriculum management has a statistically significant effect on comprehensive assessment of student achievement, and the direction is positive. This means that as conformity to CE in school curriculum management increases, comprehensive assessment of student achievement increases.

Table 7 reports hierarchical regression results (dependent variable= stimulating student creativity). Model 3.1 and Model 3.2 fit the data well: F is .801(p<.05) in model 3.1 and 9.437(p<.001) in model 3.2. The independent variables are statistically significant in explaining the dependent variable, after input of the control variable: R^2 is 0.016 in Model 3.1 and 0.396 in Model 3.2 with R^2 increased by 0.38. Model 3.1 and model 3.2 both have a tolerance (TOL) of 0.1 or more and a VIF of less than 10, confirming that there is no problem of multicollinearity between variables.

Among the independent variables, only conformity to CE

Table 6. Hierarchical Regression Results (Dependent Variable=Comprehensive assessment of student achievement)

Model		Unstandardized Coefficients		Standardized Coefficients	T(p)	Collinearity Statistics	
		B	Std. Error	Beta		Tolerance	VIF
2.1	(Constant)	45.039	6.918		6.511***		
	Subject relevance to college entrance examination	-.080	.033	-.200	-2.450*	.975	1.025
	school location	-3.797	8.250	-.064	-.460	.338	2.956
	Class size	.188	.327	.080	.573	.335	2.989
	F(p)			2.315*			
	R^2			.212			
	adj. R^2			.045			
2.2	(Constant)	12.992	11.907		1.091		
	Subject relevance to college entrance examination	-.076	.033	-.190	-2.320*	.889	1.125
	school location	3.405	3.285	.114	1.037	.491	2.038
	Class size	.501	.333	.213	1.501	.297	3.368
	CE Model School grant	-3.745	3.119	-.112	-1.201	.692	1.446
	Subject classroom facility grant	8.427	2.719	.284	3.099**	.709	1.410
	Appropriateness of textbook for CE	4.603	2.143	.200	2.148*	.691	1.448
	Fewer subjects per a semester regulation	-3.538	3.194	-.089	-1.107	.930	1.076
	Conformity to CE in school management	.320	.178	.340	2.239*	.998	1.002
	Teacher expertise for CE	1.684	2.091	.069	.805	.811	1.232
	Parental support for CE	-1.882	2.053	-.098	-.917	.520	1.925
	F(p)			2.820**			
	R^2			.263			
	adj. R^2			.103			

*p<.05, **p<.01, ***p<.001

in textbook is significantly and positively related to stimulating student creativity (β =.165).

Among control variables, subject relevance to college entrance examination is significantly and negatively related to stimulating student creativity in model 3.1 and model 3.2. Conformity to CE in school management is significantly and positively related to stimulating student creativity in model 3.2(β =0.382). Also teacher expertise for CE is (β =0.442)

Regarding the variables of grants, subject classroom facility grant is significantly and positively related to three CE policy effect in model 1.2, 2.2, and 3.2, which supports hypothesis 1.2, whereas, coefficient for Model School grant is not significant in all three models, which rejects Hypothesis 1.1.

The difference of effects of between grants is due to the differences in design and operation of each grant system. Subject classroom grants are variously $ 300,000 to $ 700,000 considering the needs of each school, whereas CE Model school grant is uniformly $20,000 for each school. The granted period for CE Model School is less than 3 years which is too short for the CE system to be settled in a school. In addition, holding events for introduction of CE experiences to other schools is some burden for CE Model Schools and their teachers. Even in the U.K, while policy makers have introduced a number of grant programs to encourage CE, there were difficulties in the implementation because grants were not designed or operated in a way that can has CE impact in schools and teaching (Nicholl & McLellan, 2008, p. 588).[8]

8 The U.K. performativity policies based on New Public Management philosophy has been central to the government's agenda and include monitoring mechanisms such as Office for Standards in Education (OSE) inspections, performance management, and school league tables, all of which are used to measure the value of a school or individual teacher (Ball, 2003, p. 216; Nicholl & McLellan, 2008, p. 586).

Table 7. Hierarchical Regression Results (Dependent Variable= stimulating student creativity)

Model		Unstandardized Coefficients		Standardized Coefficients	t(p)	Collinearity Statistics	
		B	Std. Error	Beta		Tolerance	VIF
3.1	(Constant)	2.647	.274		9.671***		
	Subject relevance to college entrance examination	-.002	.001	-.116	-1.419	.973	1.028
	school location	-.007	.326	-.003	-.020	.345	2.895
	Class size	.003	.013	.037	.268	.341	2.930
	F(p)			.801*			
	R^2			.016			
	adj. R^2			.004			
3.2	(Constant)	.508	.394		1.288		
	Subject relevance to college entrance examination	.000	.001	-.030	-.438	.886	1.129
	school location	.195	.109	.165	1.786	.489	2.045
	Class size	.002	.011	.020	.168	.309	3.241
	CE Model School grant	-.130	.103	-.099	-1.268	.685	1.459
	Subject classroom facility grant	-.081	.089	-.070	-.912	.719	1.391
	Conformity to CE in textbook	.149	.069	.165	2.153*	.713	1.402
	Fewer subjects per a semester regulation	-.087	.103	-.057	-.845	.935	1.069
	Conformity to CE in School management	.356	.54	.382	4.708***	.999	1.001
	Teacher expertise for CE	.425	.069	.442	6.198***	.826	1.211
	Parental support for CE	.058	.068	.077	.850	.515	1.941
	F(p)			9.437***			
	R^2			.396			
	adj. R^2			.354			

*p<.05, **p<.01, ***p<.001

For regulation, conformity to CE in textbook is significantly and positively related to CE policy effect in all three models, which supports hypothesis 1.3. Curriculum is one of the most important determinants of CE policy and, if this is improper, can severely constrain CE effect (Craft, 2003, p. 124). In Korea, there have been a lot of concerns that an excessive amount of textbook constrains using CE methods such as discussion, experimentation, and presentations in class (Korean Ministry of Education, 2010).

Coefficients for fewer subjects per a semester are negative in all three models, though not significant, which is the opposite of Hypothesis 1.4.

Conformity to CE in school management is significantly and positively related to CE effect in all three models, which supports Hypothesis 2.1. Teacher expertise for CE, the other street-level administration value, has statistically significant and positive relationships with stimulating student's creativity, which supports hypothesis 2.2. The result is consistent with the results of many previous researches that teachers among school-related variables matter most (RAND, 2014; Whitehurst et al., 2013).

Among implementation condition variables, subject relevance to college entrance examination is significantly and negatively related to CE policy effect in all models in this research, which supports hypothesis 3.1. This result implies that the more a subject is given much weight in the college entrance examination, the more difficult it is for teachers to do CE in class.

School location measured by a dummy variable whether the school is located in urban or rural is not significant in all three models, which rejects hypothesis 3.2 consistent with Hanushek (2003)'s findings that class-size is not statistically distinguishable from zero. Also, coefficient for class size is not significant in all three models, which rejects hypothesis 3.3 consistent with Hoxby (2000)'s findings that there is no relationship between class size and achievement among fourth and sixth graders. Parental support for CE is not statistically significant in all three models, which rejects hypothesis 3.4 .

Conclusions

This research explores how policy tools work, how they make effect, and which policy tool is more effective in diverse and complex policy environments by analysing CE policy in Korea empirically. The effect of policy tools is ex-

amined using a hierarchical regression analysis with objective administrative data and survey data on lower secondary school teachers. In addition to statistical analysis, 23 people in charge of designing CE policy nationally or managing CE policy in school or teaching students in class were interviewed to find out the relationship among variables and extract valid measurements for each variable.

The findings show that the impact of a policy tool on CE effect depends on how it is designed to work well to effective policy implementation rather than there is an absolutely effective tool for a policy. For the grants, subject classroom facility grant is positively and significantly associated with CE effect, whereas CE Model School grant isn't. For regulation, conformity to CE in textbook regulation is positively and significantly associated with CE effect, whereas the relationship between fewer subjects per a semester and CE effect isn't.

The results have several important implications for design and management for a policy tool. First, when street-level administration plays key role for policy success, such as in education policy, it is more effective to design and manage grant program bottom-up based on the needs of street-level administration rather than top-down from central government. The Model School strategy, often used as policy proliferation strategy in Korea, should be revised. MOE often, introducing new policies, selects model schools to give them grants to cover program development costs and event costs for introducing their experiences to other schools. But this strategy has not paid off in most cases including CE policy. The main reason is that public lower secondary school teachers are required to transfer every five years, and if the accumulation of CE experiences is not systemized in the school, this is the case in most public schools, the CE experiences in the school disappear with the transfer of the teacher in charge of CE. In addition, the policies in previous government are often suspended with the change of government in Korea.

Second, when a policy tool is introduced and implemented, the key implementation conditions that make the policy tool effective should be considered first. Even if a policy tool has a high theoretical validity with the policy objects, it could not be effective if the key implementation conditions are not met. The null results of fewer subjects per a semester in this research could be explained by the lack of key conditions such as incompatibility with school curriculum, mismatch with teacher supply and demand, incompatibility with the level of student recognition development, and so on (Joongang Daily, April 16, 2012; Hankook Ilbo, October 4, 2014). Particularly, variables associated with street-level administration such as conformity to CE in school curriculum management and teacher expertise for CE are important for CE policy success. The empirical findings of this study highlight the necessity of strengthening CE capacity of school and teacher for CE policy success.

From the methodological perspective, while only a handful of studies attempt to test the effects of policy tools in the field of CE policy empirically, this study attempts to measure and test the effect of policy tools on CE effect empirically. In further research, an integrated analysis framework on how policy tools including new policy tools such as information of which usability increase with technological revolution and the increase of citizen engagement, work and make effect in diverse and complex policy environments should be developed in various policy areas.

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Appendix: Questionnaire

student's creativity: In my class, students' creative thinking is promoted.

conformity to CE in textbook: The structure and contents of the textbook in charge of the teacher are appropriate for creativity education.

conformity to CE in School management: My school's operation is appropriate for creativity education.

Teacher expertise for CE: I know how to improve the creativity of students.

Parental support for CE: Parents of our school are active in supporting creativity education in school.

*All use a 4-point Likert scale (1: strongly disagree, 4: strongly agree)