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A Comparative Analysis and Validation of Instructivist and Constructivist Self-Reflective Tools (IPSRT and CPSRT) for Novice Instructional Planners

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Developing effective instructional plans from both a traditional approach (e.g., instructivist) as well as a constructivist approach is clearly important for preservice teacher education. This study was designed to validate and compare two cognitive tools, the Instructional Planning Self-Reflective Tool (IPSRT) and the Constructivist Planning Self-Reflective Tool (CPSRT), which were each found in prior research to significantly improve instructional planning performance and motivation/attitude for preservice teachers. In a repeated-measures design, 42 preservice teachers received both the IPSRT and the CPSRT in differing order (counterbalanced between groups) and wrote two instructional plans on the same topic, one with each tool. Results validated the IPSRT for its efficacy in facilitating the development of instructivist plans and the CPSRT for constructivist plan development. No significant differences were found between the IPSRT and CPSRT in participants' instructional planning performance, motivational/attitudinal impact, and perceived tool value, thus confirming that neither tool is more effective than the other. Differences were revealed in preservice teachers' perceptions of metacognitive value of each tool, where the IPSRT was found to better support self-monitoring whereas the CPSRT

better supported cognitive flexibility. Implications for implementing these two tools for instructivist and constructivist planning are discussed.

An important goal of teacher preparation programs is to convince preservice teachers of the significance of instructional planning and assist them in becoming effective instructional planners. The success of this goal is dependent upon the preservice teacher's beliefs about instructional planning, available cognitive and metacognitive strategies, and adeptness in the adopted theoretical approach to instructional planning.

First, the degree to which preservice teachers feel capable of preparing an instructional plan, known as self-efficacy (Bandura, 1986), may influence whether they will engage in the task. Students who are self-efficacious set higher goals, demonstrate more intrinsic motivation in a task, persist longer in the face of obstacles, and select more effective learning strategies (Zimmerman & Bandura, 1994). Further, preservice teachers' disposition or attitudes and perceived instrumentality (i.e., importance) regarding instructional planning could also predict their commitment to engage in effective instructional planning (Kitsantas & Baylor, 2001).

Second, the ill-structured nature of instructional planning can make the process difficult for novice preservice teachers. Jonassen (1997) clearly illustrates that instructional planning is an archetypal ill-structured problem because "the designer is constrained by circumstances, though in most design problems, there are a variety of solutions, each one of which may work as well as any other"(p. 69). Instructional interventions that embed metacognitive strategies may facilitate the instructional planning process, given its ill-structured nature. Metacognitive strategies, defined as one's ability to think about his/her own thinking and to proactively select effective strategies for different learning environments (Zimmerman & Risemberg, 1994), may include organizing, self-monitoring, self-evaluation, and cognitive flexibility. Strategies such as these have been shown to positively influence achievement in different learning contexts (Kitsantas, 2002; Zimmerman, 2000).

Third, and the focus of this study, is the need for preservice teachers to flexibly employ these cognitive and metacognitive strategies in developing instructional plans according to different instructional approaches. Considering that more than one problem-solving path is possible to reach a solution for a given instructional problem, the ability for a preservice teacher to take multiple perspectives (e.g., employ different instructional approaches) when planning is appropriate and necessary. Further, exposure to alternative in-

structional approaches has been found to facilitate metacognitive awareness of the overall instructional planning process (Baylor, 2002). Two prominent but fundamentally different instructional design approaches that currently exist in the literature, the instructivist and constructivist perspectives to developing instruction, are the focus of this article.

Instructivist or traditional models of planning emphasize knowledge transfer and more teacher-centered learning environments (Roblyer, Edwards, & Havriluk, 1997). Advocates of instructivist instruction emphasize the importance of teaching skills in a sequential manner, with more individualized work and with traditional assessment methods. A systematic, or instructivist, approach to instruction has been shown to be an effective model due to its focus on clearly identifying goals and systematically developing instructional activities and assessment that lead to the attainment of the goals (Reiser & Dick, 1996).

Constructivist planning requires a focus on more student-centered environments, to provide activities that facilitate knowledge construction and generative learning (e.g., Wittrock, 1990). Constructivist approaches have been found to be particularly beneficial for developing meaningful learning activities and engaging students in higher order thinking (Jonassen, Peck, & Wilson, 1999). Driscoll (2000) listed five features that characterize constructivist instruction:

1. embedding learning in complex and realistic environments;
2. providing for social negotiation;
3. supporting multiple perspectives and use of multiple modes of representation;
4. encouraging ownership in learning; and
5. nurturing self-awareness of the knowledge construction process (pp. 382-383).

To implement these features into constructivist planning, preservice teachers need to emphasize the process of learning more than just the end product.

As characterized here, both instructivist and constructivist approaches require advanced planning with careful attention to instructional goals and activities to accomplish them, even though instructivist planning is more prescriptive (e.g., linear, top-down) whereas constructivist planning is more descriptive (e.g., defining characteristics of learning environment) in nature. Implementing these different approaches to instructional planning can be especially difficult for novice instructional planners, particularly if they are

not provided with regular and detailed feedback.

In an effort to engage preservice teachers in self-reflective practice, two cognitive tools were developed to enhance instructional planning skills in the instructivist and constructivist instructional planning approaches: the Instructional Planning Self-Reflective Tool (IPSRT), and the Constructivist Planning Self-Reflective Tool (CPSRT) (Baylor, Kitsantas, & Chung, 2001; Kitsantas & Baylor, 2001; Kitsantas, Baylor, & Hu, 2001). These tools were designed to guide and extend the thinking processes of the students (e.g., Lajoie & Derry, 1993; Lajoie, 2000) and enhance self-regulation and metacognitive awareness during instructional planning, to aid them in understanding the complexity and comprehensiveness of the process (Baylor & Kitsantas, 2001; Baylor, Kitsantas, & Hu, 2001; Kitsantas & Baylor, 2001). Both tools are available online, at http://garnet.acns.fsu.edu/~abaylor/papers.htm#selfreg

The purpose of the present study is twofold: first, to validate whether the IPSRT and CPSRT facilitate the development of the intended planning approach (instructivist or constructivist); and, second, to compare the efficacy of the tools for enhancing instructional planning performance, metacognition, and motivation/attitudes. This evaluation is important given that it may reveal valuable information for university instructors in teacher preparation programs regarding the validity and the importance of these tools to support the instructional planning process for preservice teachers.

Description and Research on the Effectiveness of the IPSRT and CPSRT

The major goal for the development of the IPRST and CPSRT was to assist preservice teachers in becoming active participants in their own learning process. By prompting preservice teachers to monitor and reshape their instructional plans, the IPRST and CPSRT facilitate self-reflective practice and thus promote self-regulation. Indeed, both the IPSRT and CPSRT have been found to promote the use of self-regulatory processes (e.g., self-monitoring, self-evaluation, and cognitive flexibility) related to instructional planning (Baylor, Kitsantas, & Chung, 2001; Kitsantas et al., 2001). Once the tools are demonstrated by expert models (e.g., instructors of preservice teachers), they can be used without guidance during self-directed practice, assisting novice instructional planners in achieving automaticity of their skills. This is important given that multiple attempts at a new skill are required for developing expertise (Bandura, 1997; Zimmerman, 2000). These tools have been found to facilitate both instructional planning performance and improve preservice teachers' disposition, which is important considering that many preservice teachers view instructional planning as complicat-

ed and tedious (Baylor, 2002; Kitsantas & Baylor, 2001).

The IPSRT (Appendix A) was developed to support traditional, instructivist approaches to instructional planning. The Reiser and Dick (1996) instructional planning model provided the initial guidelines for its development, and incorporates the following phases: identifying instructional goals and objectives; planning instructional activities; choosing instructional media; developing assessment tools; implementing instruction; and, revising instruction. To simplify the process for preservice teachers, and to promote self-reflection, the IPRST was designed as a procedural "recipe," with specific questions and checkpoints to guide the user through the process (Baylor, Kitsantas, & Chung, 2001). It was postulated that prompting preservice teachers to self-monitor would be beneficial because it directs attention to the components of instructional planning and increases tine spent on task (Zimmerman, 1989).

The major purpose for the development of the IPSRT (Appendix A) was to engage the preservice teachers in a dynamic circle where initial monitoring of instructional components would lead to evaluation, reorganization, reintegration and then monitoring of the instructional planning process. Kitsantas and Baylor (2001) examined the effectiveness of the IPSRT on preservice teachers' performance and self-efficacy and disposition towards instructional planning with 114 preservice teachers. All participants in the experimental and control groups were taught how to develop an instructional plan as part of the course. For the intervention, the experimental group was provided with instruction how to use the IPSRT while instructional planning, whereas the control group received a review of instructional planning. It was found that the experimental group demonstrated greater skill acquisition, more positive attitudes, and higher perceived importance of instructional planning. In terms of self-efficacy, participants who were initially high in self-efficacy reported significantly lower self-efficacy following the tool intervention, whereas participants initially low in self-efficacy showed significantly higher self-efficacy following the tool intervention. This indicated the value of tool for improving confidence for the low performers while also promoting metacognitive awareness of the complexity of instructional planning for the high performers (Kitsantas & Baylor, 2001).

In contrast, the CPSRT (Appendix B) was created based on the constructivist perspective of instructional planning (Driscoll, 2000). It is organized according to three phases relevant for constructivist instruction: (a) the Before phase, which includes setting the instructional purpose and determining the desirable and required characteristics of the learning activities; (b) the During phase, which involves defining the role of the students and the instructor; and, (c) the After phase, which includes the assessment. Because of the ill-defined nature of the constructivist approach, just offering

preservice teachers strategies that they can use to write an instructional plan was not sufficient. Consequently, the CPSRT was designed as a figurative "menu" of constructivist ideas for the preservice teachers to self-evaluate the viability of the instructional activities and assessment procedures.

An important aspect in developing a constructivist instructional plan is for the preservice teacher to practice cognitive flexibility, requiring them to shift perspective on a problem and consider multiple modes of learning in order to convey the inherent complexity in the knowledge domain (Driscoll, 2000; Spiro, Vispoel, Schmitz, Samarapungavan, & Boerger, 1987). Consequently, a key goal of the CPSRT is to guide the preservice teachers in thinking more flexibly in terms of shifting their instructional role in the classroom, and facilitating student knowledge construction. Baylor and Kitsantas (2003) examined the effectiveness of the CPSRT on preservice teachers' performance and self-efficacy and disposition towards instructional planning with 58 preservice teachers. It was found that the experimental group (using the CPSRT) performed significantly better and reported more positive attitudes/motivation.

Although the IPSRT and CPSRT have each been found to be effective for improving instructional planning performance, facilitating the use of self-regulated strategies and enhancing motivation/attitude, the scope of this article was to (a) validate if each of the tools facilitate development of instructional plans from the intended instructional approach (instructivism or constructivism), and (b) compare their impact on preservice teachers' performance, motivation/attitudes, metacognition, and perceived value. To best address these issues, a repeated-measures design was implemented where preservice teachers constructed two instructional plans, one with each tool.

METHODS

Sample

The sample consisted of 42 preservice teachers in two sections of an introduction to educational technology course in a Southeast public university. As part of the course, the participants had already been taught the Reiser and Dick (1996) model of instructional planning and the constructivist approach to planning (Grabe & Grabe, 2001), but were novices in both approaches. All sections implemented identical course material throughout the course (e.g., identical lecture material, Powerpoint slides, assignments, exams).

The mean age of the sample was 20.06 years (SD=1.13). Of those re-

porting ethnicity, 76% were White, 17% were Hispanic, 5% were Black, and 2% were of other groups. Of those reporting gender, 14% of the sample were male and 86% were female. Fifty percent of the participants were sophomores and the other 50% were juniors. The average GPA of all participants was 3.17 (*SD*=.66). Prior to the study, participants were asked how important writing an instructional plan was to them on a scale where 1-not important and 5-extremely important. Overall, participants reported that instructional planning was very important (*M*=4.12, *SD*=.86).

Self-Reflective Tools

Instructional Planning Self-Reflective Tool (IPSRT). The IPSRT (as displayed in Appendix A) was developed by Baylor, Kitsantas, and Chung (2001) based on research on self-regulated learning (Zimmerman, 2000) in conjunction with the Reiser and Dick (1996) instructional planning model. It was designed to facilitate monitoring and self-evaluation during instructional planning. The major headings for the IPSRT were determined based on the Reiser and Dick model: instructional goal, objectives, materials/preparation, learner characteristics, procedure, and assessment. An additional heading was included for the quality of the overall instructional plan. Under each subheading, the IPSRT consists of multiple prompt questions.

Constructivist Planning Self-Reflective Tool (CPSRT). The CPSRT (as displayed in Appendix B) was developed by Kitsantas, Baylor, and Hu (2001) based on self-regulation research (e.g., Zimmerman, 2000) in conjunction with constructivist theories of instruction (e.g., Jonassen, 1999; Mayer, 1999). It was designed to facilitate self-monitoring, self-evaluation, and cognitive flexibility. The CPSRT is organized in three phases which were defined to represent the activities involved with implementing and assessing a constructivist instructional plan: Before, During, and After. The Before Phase consists of the following sub-components: instructional purpose, and definition of learning activities (required and desirable characteristics). The During Phase incorporates information regarding the role of the student and the role of the instructor. The After Phase includes assessment. Under each subheading, the CPSRT consists of multiple prompt questions.

Instructional Scenario

The topic of the instructional scenario was presented as follows:

> You are a sixth grade teacher of a mathematics class. A member of the president's advisory committee is visiting today and wants to see an example of your instruction to teach multiplication of fractions. For a 40-minute class period, you decide to teach your students how to multiply fractions. Imagine that you unlimited resources to assist you with writing the lesson plan. Please be as specific as possible in the space below. Since you only have 20 minutes to complete this lesson plan, budget your time wisely!

This instructional scenario was presented twice to all preservice teachers, once with either the CPSRT or IPSRT and again with the other tool (both online). This instructional scenario was selected because it did not require significant content knowledge or grade level expertise. Further, a well-defined content domain (multiplication) was chosen because it lends itself to either an instructivist or constructivist approach. Each time the instructional scenario was presented, it was accompanied by an outline of the major subheadings for the instructional plan, depending on the tool. For the IPSRT, the headings included the following: instructional goal, objectives, materials, learner characteristics, procedure, and assessment. For the CPSRT, the headings included the following: instructional purpose, defining learning activities, role of student, role of instructor, and assessment. This instructional scenario was pilot tested and modified prior to use in the study.

Measures

Separate measures were employed to validate and compare the tools. See Table 1 for a listing of research questions, measures, and data analysis.

Underlying instructional plan pedagogy. The instructional plans were scored according to their underlying pedagogy, on a scale from 1 to 10. Given that certain instructional plan features are representative of *both* instructivist and constructivist pedagogies (e.g., the importance of considering the learner's prior knowledge), the purpose of this measure was to determine whether the plans represented features that were more representative of an instructivist or a constructivist approach. Arbitrarily, it was determined that a high score would indicate the presence of more constructivist aspects to the plan such as a student-centered approach, students' involvement with constructing knowledge, a focus on students' reasoning/critical thinking, and/or situated learning. Plans scored as low in the measure (thereby high in instructivism) were characterized as more teacher-directed in approach (e.g.,

lecture, worksheets, video), with a more structured information presentation and closely-guided student questioning to ensure that the instructional goals

Table 1
Validation and Comparative Analysis Measures

	Questions	Measures	Data analysis
Tool Validation	Does IPSRT lead to plans rated as instructivist? Does CPSRT lead to plans rated as constructivist?	Underlying pedagogy of instructional plan	Paired t test
Comparative Analysis of Tools	Does either the IPSRT or CPSRT lead to better instructional planning performance?	Instructional plan overall score	Paired t test
	Does either the IPSRT or CPSRT better enhance motivation/attitudes?	Self-efficacy (pre- and post-) Disposition (pre- and post-) Satisfaction	MANOVA
	Is the IPSRT or CPSRT perceived as more valuable by preservice teachers?	Helpfulness Easy to use Usefulness Interesting Flexible Recommend to friend	MANOVA
	Are there differences between the IPSRT and CPSRT in terms of metacognitive value?	Open-ended questions (coded for self-monitoring, self-evaluation, and cognitive flexibility)	Chi-Square

were met. The two researchers met and together discussed what characterized a score of 1-10 for the presence of underlying pedagogy (where 1=not at all constructivist and 10=highly constructivist) for five sample instructional plans.

Following that, each researcher independently scored 10 instructional plans. Inter-rater reliability between the two researchers was determined to be .91 for the 10 instructional plans. After reliability was established, one of the researchers then scored the remainder of the instructional plans using the same rating scale. Both researchers were blind as to the conditions of the participants throughout the rating process.

Instructional planning performance. To assess performance, all participants developed two instructional plans (one with each tool) given the instructional scenario listed previously. Each instructional plan was scored according to a rubric that consisted of four sub-areas, each evaluated on a scale of 1-5 (where 1=poor and 5=excellent). The four sub-areas of the ru-

bric were blueprints (e.g., including the instructional goals/objectives), procedure (e.g., learning or instructional activities), assessment, and holistic (e.g., overall flow and viability of plan), each of which represented key components for any type of lesson plan. The two researchers met and together discussed what characterized a score of 1 through 5 for each sub-area of five sample instructional plans. Disagreements were resolved through discussion. Following that, each researcher independently scored 10 instructional plans. Inter-rater reliability between the two researchers was established at $r > .90$ for the ten instructional plans. One of the researchers then scored the remainder of the instructional plans using the same rubric. The overall instructional plan score was the compilation of these four sub-scores, ranging from 4-20. In scoring each instructional plan, the researchers were blind as to which tool was used by the participant.

Motivation/attitude toward instructional planning. Motivation/attitude was assessed by three dependent measures: self-efficacy, disposition, and satisfaction regarding performance. To assess *self-efficacy toward instructional planning*, a one-item scale measured the preservice teachers' self-efficacy beliefs about instructional planning and was administered before the intervention and following the use of each tool. It was developed based on Bandura and Schunk's (1981) guidelines. Prior to intervention, participants were asked "How sure are you that you can write a lesson plan?" and after the intervention, "How sure are you that you can write a lesson plan with <tool>?" on a scale from 1 being "not-sure" to 9 being "very sure." The correlation of pre- and postscores was $r=.79$, $p<.001$.

To assess *disposition regarding instructional planning*, all participants were asked to write two adjectives to "Describe what you think about instructional planning." This method was employed to obtain the participants' personal affect regarding instructional planning as opposed to the response set that could bias them to choose more favorable adjectives if presented in a list. These adjectives were coded according to three levels: as -1 if both were negative, as 0 if 1 was negative and the other positive, and as +1 if both were positive. Two raters coded the items independently and interrater reliability was established at .96. There were only two disagreements about two sets of adjectives, which were resolved through discussion. Two adjective pairs were discarded because they could not be classified. The concurrent validity of this measure was supported in Kitsantas and Baylor (2001) by a significant positive correlation between initial disposition and initial self-efficacy scores. Prior research has shown that self-efficacious students generally have positive affect (Bandura, 1986). To assess *satisfaction re-*

garding performance, following the development of each instructional plan, participants were asked "How satisfied were you with your performance on this lesson plan?" on a scale of 1-5 where 1=Not at all satisfied and 5=Extremely satisfied.

Perceived tool value. Each preservice teacher was asked to rate each tool (CPSRT and IPSRT) according to the following characteristics: (a) helpfulness where 1 (definitely not helpful) to 5 (extremely helpful); (b) easy to use; on a scale from 1 (not at all easy) to 5 (extremely easy); (c) interesting; where 1 (not at all interesting) to 4 (extremely interesting); (d) flexible; where 1 (not at all flexible) to 4 (extremely flexible); and, (e) recommendation of tool to a friend; where 1 (not at all recommend) to 4 (highly recommend).

Metacognitive value. Participants were asked to list specific reasons why each tool was helpful by way of an open-ended question. Responses were coded by two trained individuals based on three dimensions of metacognition: self-evaluation, self-monitoring, and cognitive flexibility, identified based on prior research of the tools (Baylor, Kitsantas, & Chung, 2001; Kitsantas et al., 2001). If the participant indicated that the tool was valuable for self-evaluation, s/he was assigned a "1"; if not, s/he was assigned a "0." If the participant indicated that it was valuable for self-monitoring, s/he was assigned a "1"; if not, s/he was assigned a "0". If the participant indicated that it was valuable for cognitive flexibility, s/he was assigned a "1"; if not, s/he was assigned a "0". The interrater reliability was .93 and disagreements were resolved via discussion.

Procedure

Each member of two class sections was randomly assigned to one of the two treatment groups, with the order of tool presentation counterbalanced to control for order effects. There were 21 preservice teachers in each of the two treatment groups. Although each section had a different lab instructor during the semester, for the implementation of the study the instructor-coordinator of the course (experimentor) led both of the sections. There were no significant differences in GPA between the two groups, as indicated by a *t* test. Chi-square analyses revealed no significant differences between the groups in terms of ethnicity, gender, and year in school.

All participants answered a demographics questionnaire including ques-

tions regarding gender, year in school, ethnicity, age, and grade point average. As part of this questionnaire, the participants' self-efficacy beliefs and disposition toward instructional planning were assessed. The instructor then directed the preservice teachers to "Use the tool (either the CPSRT or the IPSRT; the order was switched between groups) to assist you in developing a lesson plan for this instructional scenario" (see earlier section for scenario). Following completion of the instructional plan using the first tool, preservice teachers then answered questions regarding the first tool's value, satisfaction with performance, their disposition toward instructional planning, and self-efficacy for future instructional planning. Next, preservice teachers were directed to use the second tool and instructed to use it to write an instructional plan for the same instructional scenario. Following completion of this instructional plan, preservice teachers were asked the same questions (e.g., tool value, motivation/attitude) as listed previously.

Design and Data Analyses

A repeated measures design was implemented to control for individual differences, allowing for a stronger comparison of how the two cognitive tools differentially impacted performance and motivation. Further, this design allowed the researchers to compare the extent to which each tool facilitated the development of two instructional plans for the same scenario that were different in underlying instructional approach. The order of tool presentation was counter-balanced to control for order effects.

See Table 1 for a description of the tool validation and comparative analysis measures. Paired *t* tests were used to assess underlying plan pedagogy and instructional plan performance between plans created with the two tools. To maximize power in finding differences between the tools, repeated-measures MANOVA was the primary method of analysis for motivation/attitude and perceived tool value, with tool as the within-subject variable. A MANOVA was conducted for motivation/attitude, with satisfaction, disposition, and self-efficacy as the dependent measures. The preinvestigation scores for disposition and self-efficacy were used to determine that there were no initial differences. Paired *t* tests were used to assess differences between initial self-efficacy and disposition scores and those following each tool implementation. A second MANOVA was conducted for perceived tool value with tool helpfulness, easy to use, interesting, flexible, and worthiness of recommendation as the dependent measures. To compare the metacognitive value of the tools, chi-square analyses were conducted, with self-evalu-

ation, self-monitoring, and cognitive flexibility as the three categories.

RESULTS

See Table 2 for a listing of means and standard deviations for all dependent measures, by tool.

Table 2

Means and Standard Deviations of Dependent Measures, by Tool. (N=42)

	Measure	Tool	Mean	Std. Deviation
Underlying Pedagogy	Underlying pedagogy	CPSRT	5.59	2.67
		IPSRT	2.85	1.44
Performance	Instructional plan score	CPSRT	13.31	2.93
		IPSRT	13.05	2.96
Attitude	Disposition	Initial	.52	.63
		CPSRT	.47	.76
		IPSRT	.38	.74
	Self efficacy	Initial	4.76	1.59
		CPSRT	5.93	1.91
		IPSRT	6.19	1.92
	Satisfaction	CPSRT	3.38	.76
		IPSRT	3.40	.83
Tool Value	Helpfulness	CPSRT	2.10	.79
		IPSRT	2.02	.81
	Easy	CPSRT	3.10	1.27
		IPSRT	3.48	1.23
	Interesting	CPSRT	2.26	.94
		IPSRT	2.21	.81
	Flexible	CPSRT	2.36	.85
		IPSRT	2.31	.87
	Recommend	CPSRT	2.48	1.04
		IPSRT	2.55	.99

Underlying Instructional Plan Pedagogy

A paired t test comparing scores for underlying pedagogy indicated a significant difference, where plans created with the CPSRT were rated as significantly more constructivist (M=5.59, SD=2.67) than those plans created with the IPSRT (M=2.85, SD=1.44), $t(38)=6.36$, $p<.001$. Further, there

was only a small positive correlation of underlying pedagogy scores with performance (r =. 12, p=. 45 for IPSRT, and r=. 16, p=. 32 for CPSRT), establishing the validity of the underlying pedagogy measure as a separate dimension from performance. To illustrate the differences between underlying instructional plan pedagogy, see Tables 3 and 4 that display two sample plans created by "Sarah," one with the IPSRT and CPSRT. While she received similar performance scores for the two plans, each differed greatly from the other in terms of underlying plan pedagogy.

Table 3

Instructional plan by "Sarah" using CPSRT (Performance Score=14; Underlying Plan Pedagogy Score=10)

INSTRUCTIONAL PURPOSE:
Students, in groups, will be able to *solve* word problems written by other groups involving the multiplication of fractions.

DEFINE LEARNING ACTIVITIES:
After spending no more than ten minutes showing students how to multiply fractions they will break up into groups to test how much they have learned. They must write a word problem involving fractions, pass it on, then *solve* one working together. Students will make problems relevant to their lives and knowledge. I would facilitate learning.

ROLE OF STUDENT:
The student must take an active part in learning by collaborating with classmates and coming up with original problems. They are "forced" to understand the material better when not only solving but coming up with problems.

ROLE OF INSTRUCTOR:
My role is to briefly be sole instructor by letting students know what is going on and prerequisites. However, then I become a facilitator and encourager.

ASSESSMENT:
The individual groups would present the solved word problems with work to show how they knew what they were doing.

Performance

A paired t test comparing participants' performance indicated no significant differences between the two tools, p=. 44.

Motivation/Attitude Toward Instructional Planning

A MANOVA with tool (IPSRT, CPSRT) as a within-subjects factor and

self-efficacy, disposition, and satisfaction as the dependent measures was conducted. The overall effect of tool on motivation/attitude was not significant. Follow-up univariate analyses revealed no significant differences for each of the three dependent measures.

Table 4

Instructional Plan by "Sarah" Using IPSRT (Performance Score =15; Underlying Plan Pedagogy Score=3)

INSTRUCTIONAL GOAL:
Students will be able to solve multiplication problems with fractions.

OBJECTIVE(S):
By the end of the lesson, six grade math students will be able to solve twenty multiplication problems involving fractions with 95% accuracy.

MATERIALS/PREPARATION:
White board, marker, pencil, paper

LEVEL AND LEARNER CHARACTERISTICS:
Mostly White, boys 70% of class, like group work, 20 students, passed last math course

PROCEDURE:
1) At the end of the class we will have a contest and the first student who gets 95% on fractional multiplication will receive a free homework pass. 2) Tell the students that they will be learning how to multiply fractions. 3) Let them know that they need to be able to multiply single digits first. 4) I would give them step-by-step notes and provide examples on the white board. Then ask some to answer some in groups. I would walk around and make sure they were answering them correctly. Then we would have contest.

ASSESSMENT:
I would let them have the contest. The first student would win but all would turn in their paper so I could see how they did.

Regarding the impact of each tool on initial motivation/attitude (self-efficacy and disposition), paired *t* tests indicated significant differences between the preservice teachers' initial self-efficacy regarding instructional planning (M=4.76) and their self-efficacy following use of both the IPSRT (M=6.19), $t(41)=4.87$, $p<.001$ and the CPSRT (M=5.93), $t(41)=3.88$, $p<.001$. Regarding the impact of each tool on disposition, paired *t* tests indicated no significant differences between the preservice teachers' initial dispositions and those following use of both of the tools.

Perceived Tool Value

A repeated-measures MANOVA with tool (IPSRT, CPSRT) as a within-subjects factor and helpful, easy to use, interesting, flexible, and worthy of recommendation as the dependent measures, revealed no significant difference of tool on the composite measures. Follow-up univariate tests revealed no significant differences for each of the five dependent measures.

Metacognitive Value

Chi-square analyses indicated that the IPSRT was reported as significantly more valuable than the CPSRT for self-monitoring (f=16 vs f=27), $c\delta^2$= 5.77, p<.05, whereas the CPSRT was reported as more significantly more valuable than the IPSRT for cognitive flexibility (f=13 vs f=3), $c\delta^2$–7.72, p<.05. By percentages, the IPSRT was reported as valuable by 64% of participants for self-monitoring, by 55% for self-evaluation, and by 7% for cognitive flexibility. The CPSRT was reported as valuable by 38% of participants for self-monitoring, by 38% for self-evaluation, and by 31% for cognitive flexibility. See Table 5 for a listing of responses from four representative participants.

Table 5
Responses Regarding Tool Helpfulness From Four Selected Participants, Coded as Metacognitive Value

Participant	IPSRT	CPSRT
1	Gave me a guideline as to what to write. Gave me a way to check my work & add what was needed.	Gave me more room to be creative with my lesson plan. Did not feel as restricted.
2	I didn't remember what some of the things were. And by reading the check lists I figured out what they were.	There was more freedom & options with it. Gave lists of what should be included in each area.
3	It reminded me of what was important and what was not.	It made me think of how well the students would learn by using it.
4	It gave me steps & check-off points to guide me through making the plan. It let me know what to include.	It made me realize that I had to think about having the students learn in more than one way. It reminded me to make sure that the students would be cognitively active, engaged, and really understanding the material.

DISCUSSION

The results of this study provide validity evidence for the IPSRT as a tool for promoting the development of instructivist instructional plans and the CPSRT as a tool for facilitating constructivist instructional plan development. In comparing the two tools, no significant differences were found in preservice teachers' performance, motivation/attitudes, and perceived value of the tools. Given that results from prior experimental research indicated that each tool is effective for improving performance and enhancing motivation/attitudes (Baylor & Kitsantas, 2001, 2003; Kitsantas & Baylor, 2001), the comparative analysis of this study confirmed that neither tool is *more* effective than the other. This is important because it indicates that, depending on the desired instructional approach (instructivist or constructivist), the appropriate tool (IPSRT or CPSRT) will facilitate instructional planning performance and motivation/attitudes toward instructional planning.

Results indicated that there were no significant differences in performance between implementation of the IPSRT versus the CPSRT. This finding shows that both tools enhanced the preservice teachers' performance, even though each differed by design (recipe versus menu format) and purpose (facilitating instructivist versus constructivist approach). The finding that each tool was as effective as the other could be due to the fact that each was designed to promote a strategic approach for the particular instructional approach. Research in other learning settings has shown that providing students with powerful strategies significantly directs attention to the important elements of the task, leading to greater skill acquisition and higher motivation to pursue the task further (Schunk, 1989; Zimmerman & Kitsantas, 1999).

With reference to motivational/attitudinal impact, the composite MANOVA results indicated that there were no overall differences between the IPSRT and the CPSRT. In other words, preservice teachers felt as positive, satisfied, and self-efficacious with their instructional planning performance using either tool. Confirming prior research results, both the IPSRT and the CPSRT were found here to significantly enhance preservice teachers' self-efficacy regarding their ability to write an instructional plan. This is an important finding because self-efficacy, an indicator of motivation, is highly correlated with effort, persistence in the face of obstacles, and task achievement (Bandura, 1997). Although not replicated in this study, in prior

research both tools have also been found to improve preservice teachers' disposition following training in use of the tools (Baylor & Kitsantas, 2003; Kitsantas & Baylor, 2001). This unexpected result may be attributed to the demanding nature of the task (e.g., writing two sequential instructional plans and the associated multiple measures), or the small sample size.

Each tool facilitated metacognitive thinking, in ways reflected by its purpose and design. Specifically, the IPSRT better facilitated self-monitoring and the CPSRT better promoted cognitive flexibility. For self-monitoring, the IPSRT may be more useful than the CPSRT because it breaks down the process of instructional planning into concrete process goals. These clearly identifiable steps are characteristic of the traditional instructivist planning approach in contrast to the more open-ended constructivist approach that focuses on the roles of the student and teacher more broadly. Self-monitoring as a metacognitive process is important because it forces the preservice teacher to incorporate all necessary elements in instructional planning through self-reflection. On the other hand, cognitive flexibility was more supported by the CPSRT, as it requires the preservice teacher to consider multiple modes of learning, shift perspectives, and explore different instructional possibilities and global goals, all of which are characteristic of cognitive flexibility (Driscoll, 2000; Spiro, Vispoel, Schmitz, Samarapungavan, & Boerger, 1987).

Importantly, these differences in metacognitive value were supported by the design and format of the tools themselves. To support the more systematic and structured instructivist approach, the IPSRT was designed with a more well-defined structure, as illustrated by its "recipe" layout, thereby supporting self-monitoring. In contrast, in support of the constructivist approach, the CPSRT was designed with a more open-ended structure, as illustrated by its "menu" layout, thereby supporting cognitive flexibility. Overall, the differences in metacognitive value supported that the design of each tool was appropriate and effective for its intended instructional planning approach.

Finally, in comparing the value of the tools, results showed no significant differences between the two tools, indicating that preservice teachers perceived both the IPSRT and the CPSRT as valuable and helpful devices for instructional planning. Of anecdotal interest is that following the implementation of the study, many of the participants requested to keep the tools for future use in their methods classes.

Future research should replicate these findings with a larger sample. Ideally, the best measure of instructional planning performance is the impact of the plan on *student* learning, which could be measured on a smaller scale with inservice teachers. It would also be of interest to evaluate the impact

of the IPSRT and CPSRT with more experienced teachers. Considering that research evidence indicates that experienced teachers do not always engage in the instructional planning process (Martin, 1990; Young, Reiser, & Dick, 1998) cognitive tools may encourage them to plan and guide them through the process. Future research should investigate the role of the IPRST and CPSRT for other types of instructional scenarios. Since the scenario used in this study was well-defined in nature (multiplication of fractions), differential effects of the two tools may become evident when using a more ill-structured instructional problem. Along this line, the nature of the instructional scenario may lend itself better to using a "recipe" device as opposed to a "menu."

Overall, instructional planning is a key element of the teaching process, and the different approaches of instructivism and constructivism present challenges for novice instructional planners. Consequently, it is of great interest and practical importance to confirm in this study that *either* the IPSRT or CPSRT can serve as valuable cognitive tools to facilitate the instructional planning process. Further, the use of both tools could engage preservice teachers to figurative "switch epistemologies" in implementing the two different approaches. Based on these findings, university instructors should consider using either of these online tools to enhance not only preservice teachers' instructional planning performance and metacognition but motivation as well.

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APPENDIX A

The Instructional Planning Self-Reflective Tool (IPSRT)

Instructions:

After you write a section of your lesson plan, review each question in the appropriate section below. Check either the "yes" or "no" box as you reflect on your lesson plan. If you answer "no" for any statement, that is an indication that you should modify your lesson plan accordingly.

INSTRUCTIONAL GOAL:

- Is the statement relatively general and broad stating what the learner should achieve? ❑ yes ❑no
- Does it state WHAT you want the learner to achieve, not HOW you are going to do it? ❑ yes ❑no

OBJECTIVE(s):

- *Does each objective derive directly and logically from one of the instructional goals? ❑ yes ❑no
- Are all four of the following components present for each objective? ❑ yes ❑no

1. Audience
   - Does this component state who will be doing the performance? ❑ yes ❑no
   - Is it stated from the LEARNER's perspective, NOT the INSTRUCTOR's perspective? ❑ yes ❑no
2. Behavior
   - Is the behavior specific and explicit? ❑ yes ❑no
   - Is the behavior measurable and observable? ❑ yes ❑no
   - Does the behavior state what the learner will do at the END of instruction, not DURING instruction? ❑ yes ❑no
   - Is there <u>one</u> active verb? ❑ yes ❑no
3. Condition
   - Is the context for the behavior specified? ❑ yes ❑no
   - Does this component clarify the conditions under which the performance will be done? ❑ yes ❑no
4. Degree
   - Does this component clarify how well/to what extent the performance must be done? ❑ yes ❑no
   - Is it specific and measurable? ❑ yes ❑no

MATERIALS / PREPARATION:

- Is everything included here that is needed for the instructional activities (in the procedure section)? ❑ yes ❑no

LEVEL AND LEARNER CHARACTERISTICS:

- Are all relevant characteristics of the students included (e.g., general characteristics, ethnicity, gender, grade level, preferences or learning styles, perceptual preferences, group size)? ❑ yes ❑ no
- Are your objectives appropriate for these particular learners? ❑ yes ❑no

PROCEDURE:

Motivating students:

- Does this activity motivate these particular learners? ❑ yes ❑no
- Do you gain the learners' attention? ❑ yes ❑no

Informing students of objectives:

- Do you inform the students of what it is that they are going to be able to do when they finish the instructional process? ❑ yes ❑no

Helping students recall prerequisites:

- Have you reminded students of any relevant prior knowledge that is related to this new topic? ❑ yes ❑no

Presenting Info and Examples:

- Have you provided all necessary information about the subject in order for students to eventually perform the objectives? ❑ yes ❑no
- Have you provided examples so that the students can see how they can use the information? ❑ yes ❑no

Provide Practice and Feedback:

- Have you provided practice opportunities that are directly related to the skills, knowledge, and attitudes reflected in the objectives? ❑ yes ❑no
- Have you provided feedback to the students? ❑ yes ❑no

Summarizing the lesson:

- Have you summarized the lesson to bring closure and help reinforce the skills and knowledge that the students have just acquired? ❑ yes ❑no

ASSESSMENT:

- Does your assessment clearly align with your objectives?
  ❑ yes ❑no
- Do the active verbs of the test items MATCH the active verbs of the objectives?
  ❑ yes ❑no

OVERALL:

- *Is each objective effectively taught and assessed? ❑ yes ❑no
- Does the lesson flow logically and easily through each section from goals to assessment?
  ❑ yes ❑no
- Is there an instructional purpose for each activity (in procedure section) ?
  ❑ yes ❑no
- Are the materials appropriate for the learners? ❑ yes ❑no
- Have you included all the materials necessary for the activities (in procedure section)?
  ❑ yes ❑no
- Is the instructional media that you chose appropriate for each activity (in procedure section)?
  ❑ yes ❑no
- Do you think your assessment items reflect what you think students should have learned?
  ❑ yes ❑no

APPENDIX B

PHASE	INSTRUCTIONAL PURPOSE
BEFORE	Do the learning outcomes describe one or more of the following for the learner: • Reasoning skills? yes • Critical thinking? yes • Retention? yes • Understanding of multiple perspectives? yes • Cognitive flexibility? yes • Self-regulation? yes • Reflection and/or self-awareness? yes • Application? yes Are learning outcomes directed toward <u>useful personal knowledge</u>? yes no <u>DEFINE LEARNING ACTIVITY(IES):</u> <u>REQUIRED CHARACTERISTICS</u> Do the activity(ies) • fulfill the instructional purpose?❑ yes ❑no • require the student to be cognitively active? ❑ yes ❑no • focus more on the learning <u>process</u> rather than specific knowledge? ❑ yes ❑no • promote the personal interest of your students?❑ yes ❑no • integrate information with students' prior knowledge? ❑ yes ❑no Are the activity(ies): • relevant ❑ yes ❑no • meaningful ❑ yes ❑no • and authentic ❑ yes ❑no <u>DESIRABLE CHARACTERISTICS</u> Are the activity(ies): • ill-structured tasks? ❑ yes • complex?❑ yes • multi-disciplinary?❑ yes • including "What-If" questions?❑ yes • encouraging multiple perspectives? ❑ yes • involving cognitive conflict? ❑ yes • including discussion and/or collaboration?❑ yes • defined in part by the learner? ❑ yes Does the social environment for the activities: • involve social negotiation and communication? ❑ yes • involve the sharing of information and/or culture? ❑ yes

DURING	ROLE OF STUDENT Are the students • engaged and cognitively active? yes no • taking responsibility for learning? yes no • selecting appropriate strategies? yes no • monitoring their progress? yes no • self-evaluating? yes no • reflecting on their performance? yes no ROLE OF INSTRUCTOR Is the instructor: • helping the students to recognize appropriate prior knowledge? ❑ yes ❑no • facilitating learning rather than directly teaching? ❑ yes ❑no • guiding the students to achieve the task independently? ❑ yes ❑no • helping the students to develop connections between principles, theory, and real life? ❑ yes ❑no • encouraging student ownership of the process? ❑ yes ❑no • challenging the students' ideas when appropriate? ❑ yes ❑no • encouraging students to monitor their thinking? ❑ yes ❑no • facilitating students' learning through the process? ❑ yes ❑no If students are working in collaborative groups, then is the instructor facilitating the group work and encouraging interaction? ❑ yes ❑no If students are working independently, then is the instructor providing access to the information needed to complete the activity? ❑ yes ❑no
AFTER	ASSESSMENT Is the assessment directly linked to the instructional purpose? ❑ yes ❑no Does it involve some sort of performance by the learner? ❑ yes ❑no Does the assessment evaluate: • Reasoning skills? ❑ yes • Critical thinking? ❑ yes • Retention? ❑ yes • Understanding of multiple perspectives? ❑ yes • Cognitive flexibility? ❑ yes • Self regulation? ❑ yes • Reflection and/or self-awareness? ❑ yes • Application? ❑ yes