

***MATHEMATICAL CREATIVE THINKING SKILLS MAHASISWA  
CALON GURU MATEMATIKA DALAM MERANCANG  
TEACHING MATERIAL BERBANTUAN DYNAMIC GEOMETRY SOFTWARE***

**DISERTASI**

Diajukan untuk Memenuhi Sebagian dari Persyaratan untuk Memperoleh Gelar  
Doktor dalam Bidang Pendidikan Matematika



Promovenda

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FAKULTAS PENDIDIKAN MATEMATIKA DAN ILMU PENGETAHUAN ALAM  
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2024**

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# ***MATHEMATICAL CREATIVE THINKING SKILLS MAHASISWA CALON GURU MATEMATIKA DALAM MERANCANG TEACHING MATERIAL BERBANTUAN DYNAMIC GEOMETRY SOFTWARE***

Oleh  
Endang Istikomah

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Sebuah Disertasi yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Doktor Pendidikan (Dr.) pada Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam

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DISERTASI**

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*MATHEMATICAL CREATIVE THINKING SKILLS MAHASISWA  
CALON GURU MATEMATIKA DALAM MERANCANG  
TEACHING MATERIAL BERBANTUAN DYNAMIC GEOMETRY SOFTWARE*

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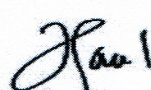
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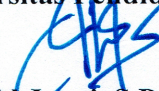
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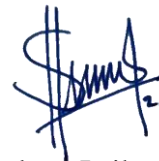
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## PERNYATAAN

Dengan ini saya menyatakan bahwa disertasi dengan judul “*Mathematical Creative Thinking Skills Mahasiswa Calon Guru matematika dalam Merancang Teaching Material Berbantuan Dynamic Geometry Software*” beserta seluruh isinya adalah benar-benar karya saya sendiri dan saya tidak melakukan penjiplakan atas pengutipan dengan cara-cara yang tidak sesuai dengan etika keilmuan yang berlaku. Atas pernyataan ini saya siap menanggung resiko sanksi yang dijatuhkan kepada saya apabila di kemudian hari ditemukan adanya pelanggaran terhadap etika keilmuan dalam karya saya ini atau ada klaim dari pihak lain terhadap keaslian karya saya.

Pekanbaru, 01 Agustus 2024

Yang membuat pernyataan



Endang Istikomah

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Bandung, 01 Agustus 2024



Endang Istikomah

## ABSTRAK

**Endang Istikomah. 2024. *Mathematical creative thinking skills* mahasiswa calon guru matematika dalam merancang *teaching material* berbantuan *dynamic geometry software*.**

Tujuan penelitian ini adalah untuk mendeskripsikan secara komprehensif tentang *Mathematical creative thinking skill* dan mendeskripsikan proses dalam merancang *Teaching Material* (TM) berbantuan *Dynamic Geometry Software* (DGS) bagi mahasiswa calon guru matematika. Penelitian ini merupakan penelitian kualitatif dengan desain penelitian *fenomenologi hermeneutik*. Penelitian ini melibatkan 33 partisipan, dengan 6 diantaranya dianalisis secara mendalam. Melalui penelitian ini diperoleh bahwa penguasaan mahasiswa calon guru tentang pengetahuan geometri dalam pembelajaran menunjukkan pemahaman yang mendalam dan mampu menghasilkan solusi yang inovatif, sementara yang lainnya mengalami kesulitan dalam memecahkan masalah dan menghadapi kendala dalam proses berpikir kreatif. Proses berpikir mahasiswa calon guru dalam merancang TM berbantuan DGS terbagi menjadi 3 komponen diantaranya komponen *content*, komponen *construct* dan komponen bahasa. Aspek-aspek dari komponen *content* yaitu: (1) menganalisis kebutuhan, (2) menentukan tujuan, atau (3) meninjau materi, atau (4) memperhatikan pertanyaan umum yang sering muncul dan atau (5) mencari inspirasi dari luar. Aspek-aspek dari komponen *construct* diantaranya: (1) mengidentifikasi masalah, atau (2) mengulas teori, (3) memodulasi proses desain, (4) menentukan model atau strategi pembelajaran. Berikutnya dari aspek bahasa diantaranya: (1) membaca referensi, atau (2) meninjau bahasa yang lazim digunakan, (3) mendiskusikan bahasa yang dipilih, (4) menggunakan bahasa. Proses berpikir mahasiswa calon guru dalam merancang TM berbantuan DGS dengan mengintegrasikan indikator berpikir kreatif diantaranya: (1) mencari referensi, (2) memperdalam materi, (3) menggunakan pendekatan atau model yang berbeda, (4) mengintegrasikan bahan dan masalah dengan teknologi, (5) melakukan tes turnitin untuk menentukan tingkat kesamaan dan mencegah plagiarisme, sehingga bisa dilakukan diskusi revisi atau perbaikan. Jika ditinjau dari materi dan aplikasinya terhadap jenis DGS terdapat 4 aspek diantaranya: (1) menetapkan tujuan; (2) mendesain arah pembelajaran; (3) memilih jenis DGS; dan (4) memilih materi. Rancangan TM berbantuan DGS yang dilakukan mahasiswa calon guru adalah menghasilkan bahan ajar geometri yang cukup valid hingga sangat valid. Keterampilan berpikir kreatif mahasiswa calon guru dalam merancang TM berbantuan DGS adalah (1) kemahiran dalam merumuskan pertanyaan terbuka dan menyajikan permasalahan sesuai dengan konteks dunia nyata; (2) terampil dalam merumuskan, mengintegrasikan pertanyaan serta penggunaan teknologi dalam pengajaran geometri; (3) memahami konsep dasar. Kesulitan mahasiswa dalam merancang TM berbantuan DGS diantaranya: (1) memahami konsep geometri dan mengintegrasikannya dengan *software* yang digunakan; (2) merancang *content* dan melakukan integrasi DGS ke dalam materi ajar; (3) fluktuasi tingkat kesulitan yang dialami dari pertemuan ke pertemuan; (4) memahami materi secara umum; dan (5) menentukan komponen pada bahan ajar. Partisipan masih meniru buku teks saat menghadapi masalah dalam urutan penyajian materi dan cenderung mengikuti buku rujukan tanpa mempertimbangkan karakteristik materi dalam merancang materi geometri, hal ini berpotensi menimbulkan *epistemologi obstacles* dan *didactical obstacles*.

Kata kunci: *Dynamic Geometry Software*, Mahasiswa Calon Guru Matematika, *Mathematical Creative Thinking Skills*, *Teaching Material*.



## ABSTRACT

**Endang Istikomah. 2024. Mathematical creative thinking skills of prospective mathematics teacher students to design teaching materials assisted by dynamic geometry software.**

This research aims to comprehensively explore mathematical creative thinking skills and dissect the process of designing Teaching Materials (TM) using Dynamic Geometry Software (DGS) for pre-service mathematics student teachers. This research employed qualitative methods through a hermeneutik phenomenological research design. Thirty-three participants were involved in this research, with six of them analyzed in depth. The findings indicate that pre-service student teachers demonstrate a strong grasp of geometric knowledge, showcasing their ability to present innovative solutions while facing challenges in problem-solving and creative thinking processes. The process of pre-service student teachers' thinking in designing DGS-assisted TM is divided into three components: content, construct, and language. There are five aspects to the content components: (1) analyzing needs, (2) determining goals, (3) reviewing materials, (4) answering general questions, and (4) drawing inspiration from nature. The components of the construct include (1) identifying problems, (2) reviewing theory, (3) modulating the design process, and (4) determining learning strategies. Last, the language components include: (1) reading references, or (2) reviewing commonly used language, (3) discussing the chosen language, and (4) using the language. To design DGS-assisted TM with creative thinking, pre-service student teachers should (1) look for references, (2) deepen the material, (3) use different approaches or models, (4) integrate materials with technology, and (5) implement Turnitin test to prevent plagiarism. Four aspects to consider when reviewing DGS material and application are: (1) setting goals, (2) designing learning directions, (3) selecting the DGS type, and (4) choosing materials. The DGS-assisted TM design performed by pre-service student teachers was to produce geometry teaching materials that range from quite valid to very valid. The creative thinking skills of pre-service student teachers in designing DGS-assisted TM are as follows: (1) proficiency in formulating open-ended questions and presenting problems according to real-world contexts; (2) skill in formulating, integrating questions, and using technology in teaching geometry; (3) understanding of basic concepts. Student teachers face challenges when designing DGS-assisted TM, including difficulties in (1) understanding geometric concepts, (2) integrating them with the software and designing content, (3) dealing with levels of difficulty fluctuations, (4) comprehending the materials, and (5) determining teaching material components. Participants tended to imitate textbook contents when facing presentation challenges and relied on reference books without considering material characteristics in designing geometry lessons. This issue poses a significant challenge as it has the potential to create both epistemological and didactic obstacles.

**Keywords:** Dynamic Geometry Software, Pre-service Mathematics Students Teachers, Mathematical Creative Thinking Skills, Teaching Materials.

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