# PENGARUH *EXPERIENTIAL LEARNING* BERBANTUAN MEDIA *AUGMENTED REALITY* DAN *DIRECT INSTRUCTION* BERBANTUAN MEDIA *AUGMENTED REALITY* TERHADAP KEMAMPUAN PENALARAN MATEMATIS SISWA DITINJAU DARI LEVEL *SELF-REGULATED LEARNING*

**DISERTASI**

diajukan untuk memenuhi sebagian syarat memperoleh
gelar Doktor Pendidikan Matematika

oleh:

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**PROGRAM STUDI PENDIDIKAN MATEMATIKA**
**FAKULTAS PENDIDIKAN MATEMATIKA DAN ILMU PENGETAHUAN ALAM**
**UNIVERSITAS PENDIDIKAN INDONESIA**
**2024**

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**PENGARUH *EXPERIENTIAL LEARNING* BERBANTUAN MEDIA *AUGMENTED REALITY* DAN *DIRECT INSTRUCTION* BERBANTUAN MEDIA *AUGMENTED REALITY* TERHADAP KEMAMPUAN PENALARAN MATEMATIS SISWA DITINJAU DARI LEVEL *SELF-REGULATED LEARNING***

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## PERNYATAAN

Dengan ini saya menyatakan bahwa disertasi dengan judul "Pengaruh *Experiential Learning* berbantuan Media *Augmented Reality* dan *Direct instruction* berbantuan Media *Augmented Reality* terhadap Kemampuan Penalaran Matematis Siswa ditinjau dari Level *Self-Regulated Learning*" ini beserta seluruh isinya adalah benar hasil karya saya sendiri. Saya tidak melakukan penjiplakan atau pengutipan dengan cara-cara yang tidak sesuai dengan etika ilmu yang berlaku dalam masyarakat keilmuan. Atas pernyataan ini, saya siap menanggung resiko/sanksi apabila di kemudian hari ditemukan adanya pelanggaran etika keilmuan atau ada klaim dari pihak lain terhadap keaslian karya saya ini.

**Bandung, Agustus 2024**

Yang Membuat Pernyataan,

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# KATA PENGANTAR

Segala puji syukur dipanjatkan kehadirat Allah SWT, atas limpahan rahmat dan hidayahNya, penulis dapat menyelesaikan disertasi ini. Disertasi ini merupakan salah satu persyaratan yang harus dipenuhi untuk memperoleh gelar Doktor Pendidikan Matematika pada Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam Universitas Pendidikan Indonesia. Disertasi ini berjudul "Pengaruh *Experiential Learning* berbantuan Media *Augmented Reality* dan *Direct instruction* berbantuan Media *Augmented Reality* terhadap Kemampuan Penalaran Matematis Siswa ditinjau dari Level *Self-Regulated Learning*". Penulis berharap disertasi ini dapat memberikan manfaat bagi pengembangan pendidikan. Namun demikian, penulis menyadari bahwa disertasi ini masih jauh dari sempurna, oleh karena itu, kritikan dan saran yang konstruktif sangat penulis harapkan.

Akhirnya, penulis mengucapkan terima kasih kepada segenap pihak yang telah membantu dalam penyusunan disertasi ini.

Bandung, Agustus 2024

Penulis,

Aya Shofia Maulida

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# UCAPAN TERIMA KASIH

*Bismillahirrahmanirrahim*, Alhamdulillah segala puji syukur penulis panjatkan kehadirat Allah Subhaanahuwata'alaa yang telah memberikan limpahan rahmat, nikmat, berkat dan hidayah-Nya, sehingga disertasi yang berjudul "Pengaruh *Experiential Learning* berbantuan Media *Augmented Reality* dan *Direct Instruction* berbantuan Media *Augmented Reality* terhadap Kemampuan Penalaran Matematis Siswa ditinjau dari Level *Self-Regulated Learning"* ini dapat selesai pada waktunya. Sholawat dan Salam kita sampaikan kepada Rosulullah Muhammad Shallallahu'alaihiwasallam yang telah menjadi pembawa cahaya islam kepada umatnya, semoga kita termasuk golongan yang mendapat syafa'atnya. Amiin.

Penulis menyadari banyak sekali bantuan yang penulis dapatkan berupa doa, moril, materi dan imaterial yang diperoleh secara langsung maupun tidak langsung dari berbagai pihak selama perkuliahan dan penyelesaian disertasi ini. Oleh sebab itu, izinkanlah penulis enyampaikan ucapan terima kasih yang terdalam kepada semua pihak yang telah membersamai dalam perjalanan penulis selama ini, yakni kepada:

1. Bapak Prof. Dr. H. Wahyudin, M.Pd selaku Promotor, yang telah begitu banyak meluangkan waktunya di tengah kesibukan beliau untuk membaca, mengoreksi, memberikan saran dan masukan pada disertasi ini, serta memotivasi, mendukung penuh penulis selama masa perkuliahan dan bimbingan, sehingga disertasi ini dapat selesai dengan sebaiknya.
2. Bapak Prof. Turmudi, M.Ed., M.Sc., Ph.D., selaku Ko-Promotor yang terus memberikan bimbingan, ide, motivasi, dan memberikan semangat dalam menyelesaikan penelitian sehingga termotivasi untuk menyelesaikan disertasi.
3. Ibu Dr. Elah Nurlaelah, M.Si. selaku Anggota yang juga terus memberikan bimbingan, ide dan gagasan dengan tulus, memotivasi, serta memberikan semangat dalam menyelesaikan penelitian sehingga termotivasi untuk menyelesaikan disertasi.

4. Bapak/Ibu Dosen Program Studi Pendidikan Matematika Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam Universitas Pendidikan Indonesia yang tidak dapat disebutkan satu persatu yang telah memberikan banyak ilmu pengetahuan, bimbingan, arahan, dan motivasi yang bermanfaat bagi penulis selama berkuliah di Universitas Pendidikan Indonesia.
5. Bapak kepala sekolah dan guru mata pelajaran di sekolah tempat penelitian dilakukan yang telah memberikan izin dan kesempatan kepada penulis sehingga penulis dapat memperoleh data yang dibutuhkan selama penelitian
6. Kedua orang tua, Bapak Saifudin Zuhri dan Ibu Dewi Nurseha yang tiada henti memberikan doa dan semangat dalam menyelesaikan seluruh rangkain studi ini, serta adik-adik, Alfi Fahmi, Ainun Nasihah, dan Sauki Futaki, terima kasih atas segala dukungan yang telah diberikan.
7. Teman-teman bermain semasa berkuliah di Universitas Pendidikan Indonesia, yang selalu mengingatkan, memberikan doa, motivasi dan berbagi pengalaman secara langsung maupun tidak langsung, sehingga perkuliahan dan penulisan disertasi ini lebih hidup dan dapat selesai pada waktunya.
8. Rekan mahasiswa S3 Pendidikan Matematika Universitas Pendidikan Indonesia dari tahun ke tahun (lintas angkatan), yang tidak dapat penulis sebutkan satu persatu, yang selalu mengingatkan, memberikan doa, bantuan materi dan imateriel, saran, motivasi dan ilmu pengetahuan, berbagi pengalaman secara langsung maupun tidak langsung, semoga Allah Subhanahuwata'ala memudahkan kami semua dalam mewujudkan cita-cita.

Penulis menyadari juga bahwa masih banyak pihak yang tidak dapat disebutkan satu-persatu, semoga Allah Subhanahuwata'ala mengampuni kekhilafan penulis dan selalu memberikan kebahagiaan, keberkahan kepada semua pihak beserta keluarganya, serta membalas jasa baik dengan limpahan kebaikan yang lebih. *Aamiin yaa Rabbal'alamiin*.

Bandung, Agustus 2024

**Aya Shofia Maulida**

# ABSTRAK

Aya Shofia Maulida (2024). Pengaruh *Experiential Learning* berbantuan Media *Augmented Reality* dan *Direct Instruction* berbantuan Media *Augmented Reality* terhadap Kemampuan Penalaran Matematis Siswa ditinjau dari Level *Self-Regulated Learning*.

Penalaran matematis tidak hanya mencakup kemampuan berpikir logis, tetapi juga keterampilan untuk mengaplikasikan konsep dan prosedur matematis dalam berbagai konteks. Namun, meningkatkan kemampuan ini seringkali menjadi tantangan, terutama jika siswa tidak memiliki strategi belajar yang efektif. Salah satu pendekatan yang dapat digunakan untuk mengatasi hal ini adalah dengan menerapkan model pembelajaran yang inovatif, seperti *Experiential Learning* berbantuan media *Augmented Reality* (EL-AR) dan *Direct Instruction* berbantuan media *Augmented Reality* (DI-AR). Penggunaan teknologi AR dalam pembelajaran dapat memberikan pengalaman belajar yang lebih interaktif dan mendalam. Selain itu, tingkat *Self-Regulated Learning* (SRL) juga diyakini mempengaruhi efektivitas pembelajaran tersebut. Oleh karena itu, penelitian ini bertujuan untuk menganalisis dan mendeskripsikan secara komprehensif tentang pengaruh EL-AR dan DI-AR terhadap perolehan dan peningkatan kemampuan penalaran matematis (KPM) siswa dengan memperhatikan level SRL siswa, serta diperolehnya konjektur yang mengaitkan SRL siswa dengan KPM siswa. Metode dalam penelitian ini adalah *mix method* dengan desain *explanatory sequential*. Tahap kuantitatif terlebih dahulu kemudian tahap kualitatif. Pada tahap kuantitatif digunakan desain *one group pretest-posttest design*, *factorial design* 3 x 2, dan analisis regresi. Sedangkan pada tahap kualitatif digunakan desain *case study* dengan prespektif *grounded theory* untuk memperoleh konjektur yang mengaitkan *self-regulated learning* dengan kemampuan penalaran matematis siswa. Dari penelitian ini diperoleh kesimpulan: i) terdapat perbedaan pengaruh level SRL terhadap peningkatan kemampuan penalaran matematis siswa; ii) terdapat efek interaksi antara pembelajaran dan level SRL terhadap perolehan kemampuan penalaran matematis siswa; iii) kemampuan penalaran matematis siswa yang memiliki level SRL tinggi pada siswa yang belajar dengan model *experiential learning* berbantuan *augmented reality* (EL-AR) dapat mengenali dan menjelaskan pola dan hubungan matematika, menghubungkan konsep matematika yang berbeda dan menggabungkan konsep untuk penyelesaian masalah matematika, membuat kesimpulan umum dan khusus, menarik kesimpulan logis, membuat kesimpulan umum kasus khusus matematika, analisis mendalam, menguji kebenaran pernyataan, penjelasan logis dan konsisten, mencari solusi yang tidak biasa dalam menyelesaikan masalah matematika, memberi jawaban lebih dari satu jawaban, dan menyampaikan penyelesaian masalah matematika secara jelas, matematis dan teratur.

**Kata Kunci:** *augmented reality, direct instructions*, *experiential learning*, kemampuan penalaran matematis, *self-regulated learning*.

# ABSTRACT

**Aya Shofia Maulida (2024).** ***The Effect of Experiential Learning with Augmented Reality and Direct Instruction with Augmented Reality on Mathematical Reasoning Abilities Limited by Self-Regulated Learning Levels.***

Mathematical interpretation includes not only the ability to think logically but also the skills to apply mathematical concepts and procedures in a variety of contexts. However, improving these skills is often a challenge, especially if students do not have an effective learning strategy. One approach that can be used to address this is to implement innovative learning models, such as experiential learning with augmented reality media (EL-AR) and direct instruction with augmented reality media (DI-AR). The use of AR technology in learning can provide a more interactive and in-depth learning experience. In addition, the level of self-regulated learning (SRL) is also believed to influence the effectiveness of the learning. Therefore, the study aims to analyze and describe comprehensively the influence of EL-AR and DI-AR on the acquisition and improvement of the ability of mathematical reasoning students by paying attention to the level of self-regulated learning students, as well as the obtained conjecture that associates self-regulated learning students with the ability to mathematically reason students. The method in this research is a mix method with a sequential explanatory design. a quantitative stage first, then a qualitative stage. In the quantitative stage, a one-group pretest-posttest design, a 3 x 2 factorial design, and regression analysis were used. Meanwhile, in the qualitative stage, a case study design was used with a grounded theory perspective to obtain a conjecture that links self-regulated learning with students' mathematical reasoning abilities. From this research, it can be concluded that: i) there are differences in the effect of the level of self-regulated learning on improving students' mathematical reasoning abilities; ii) there is an interaction effect between learning and the level of self-regulated learning on students' acquisition of mathematical reasoning abilities; iii) the mathematical reasoning abilities of students who have a high level of self-regulated learning in students who learn with the experiential learning model assisted by augmented reality (EL-AR) can recognize and explain mathematical patterns and relationships, connect different mathematical concepts and combine concepts to solve mathematical problems, create general and specific conclusions, drawing logistical conclusions, making general conclusions in special cases of mathematics, in-depth analysis, testing the truth of statements, logical and consistent explanations, looking for unusual solutions in solving mathematical problems, giving more than one answer, and conveying solutions to mathematical problems clearly, mathematically and regularly.

**Keyword:** *direct instruction s*, *experiential learning*, *mathematical reasoning abilities*, *self-regulated learning*

# DAFTAR ISI

# DAFTAR TABEL

# DAFTAR GAMBAR

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