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DEVELOPING AN INTERACTIVE MULTIMEDIA DESIGN FOR CHRISTIAN EDUCATION (PAK) IN ELEMENTARY SCHOOLS IN GORONTALO CITY, INDONESIA

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Abstract

This research focuses on (1) developing a valid, interactive multimedia design product for Christian education in elementary schools, (2) generating steps to develop a practical, interactive multimedia design for Christian education in elementary schools, and (3) identifying the possible effects of the developed interactive multimedia design product for Christian education in elementary schools on learning outcomes. This research generated an innovative, creative, and interactive multimedia design by combining ADDIE and Pustekom learning models and accommodating Edgar Dale's learning experiences. The design was **the SAHAT Model**, made up of five stages: **Studi awal** (preliminary study), **Analisis** (analysis), **Harmonisasi** (harmonization), **Evaluasi** (evaluation), and **Tetapkan** (determination) with nine simpler, more detailed, and understandable steps. The combination successfully allowed us produce an evidently effective product. The pre-test, carried out before the interactive multimedia learning, demonstrated evidence where 25% of students achieved learning completeness, while 75% others did not. The field test exhibited the potential effects of prototype 3. It was attested to by increased learning activities after the use of interactive multimedia generated from the SAHAT model application. Student test and observation results indicated 95% of student's attained learning completeness. Nine students scored 93-100 with an excellent category, and ten scored 80 with a good category. As the KKM was75, 19 students (95%) fulfilled the Minimum Completeness Criteria (KKM) or completed. This research, accordingly, had generated practical interactive multimedia for Christian Education (PAK) for elementary school students. The generated interactive multimedia were attractive for students, understandable, and effective to make them understand materials better.

Keywords: ADDIE Model, SAHAT Model, Interactive Multimedia, Christian Education

INTRODUCTION

The COVID-19 pandemic era gives new challenges to the education world. The COVID-19 pandemic-related situations and conditions compel the education world to hold online or offline learning, preventing any lost learning. The combination of online and offline learning, so-called blended learning, indicates the mixing/integration of learning systems. Capone (2017) argues blended learning constitutes a new learning methodology, encompassing offline and online learning and combining traditional learning with computer-based activities through the uses of tablets, smartphones, or other technology. It is considered more attractive compared with single offline or online teaching only (Capone et al., 2017:10478-10482).

Education is a conscious effort planned to realize a particular learning atmosphere and process which enables students to creatively develop self-potencies to have spiritual-religious power, self-control, personality, intelligence, morals, and necessary skills contributing to the self, community, nation, and state (Law of the Republic of Indonesia Number 20 of 2003).

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Government Regulation Number 55/2007 concerning Religious Education and Religious Affair Education was then issued to meet the demand of Law Number 20/2003. Religious education is expected to provide knowledge and build student attitudes, personality, and skills in practicing their religious teachings through at least courses at all education lines, levels, and types. Christian Education is one of the Religious Education. It functions to provide science and build student attitudes and skills related to religious teaching practices.

Christian Education at an elementary school level is specifically designed to build children's spiritual and mental aspects and lay a strong baseline of faith from early years. Our preliminary study identified third graders, 8-12 years old on average and learning religious education at three schools in Gorontalo City, i.e., Sekolah Dasar Perguruan Yayasan Maesa, Sekolah Dasar Perguruan Yayasan Katolik, and Sekolah Dasar Negeri No. 41 belonged to a concrete operational level. A teaching-learning process better begins from concrete to abstract material learning. An effective solution to the process is implementing multimedia learning.

The designed PAK learning materials are adjusted to child development needs. Children are expected to acquire PAK from PAK teachers. Our preliminary study, conducted using questionnaires and interviews, indicated most learning processes were executed using a lecturing method and reading books. PAK was delivered through monotonous media, resulting in unattractive and unchallenging learning, bored students, and poor learning achievements.

Teachers and students are in need of various, interesting, and fun learning media. Innovations and creativity, as such, are demanded in the development of an interactive multimedia design for PAK. The SAHAT learning model combines some learning models and is oriented to both systems and products. The SAHAT model is developed to provide teachers and students with valid, practical, and helpful interactive learning media, helping the first party to deliver comprehensive materials for the second one. This learning model is also envisaged to alleviate student boredom while learning, making them attracted and active in the learning process. It will positively impact their learning outcomes.

This research aims to produce a practical, interactive multimedia design for Christian Education (PAK) in elementary schools. The design is expected to be able to heighten student learning outcomes. The design product is called the SAHAT model.

METHOD

This development research was in a formative-evaluation type. The SAHAT model was developed based on ADDIE and Pustekom models. Data were collected using several instruments, namely observation, documentation, and test. Data collected were analyzed using the descriptive-quantitative technique by converting quantitative data resulting through validation and product tests into quantitative ones building on product validity and reliability.

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RESULTS

A. Developing Interactive Multimedia for PAK Using the SAHAT Model

This research deployed ADDIE and Pustekom models by accommodating Edgar Dale's learning Experiences. The SAHAT model, the generated learning model, was composed of five stages.

1. The first stage, **Preliminary Study**, comprised two steps, which were:
    a. Literature study to determine general objectives.
    b. Preliminary study to collect data.
2. The second stage, **Analysis**, included internal and external analyses. The internal analysis consisted of analyzing PAK competencies and materials, whereas the external one was analyzing students. An information system analysis related to multimedia information technology was also done.
3. The third stage, **Harmonization**, covered designing steps. Summarizing the Main Contents of Materials (PPIM)/flowchart and making a storyboard or electronic script (PS/NE) were executed in this stage.
4. The fourth stage, **Application**, consisted of two following steps:
    a. Expert Validation (VA), made up of content/material, multimedia, and language expert validation.
    b. Evaluation, composed of:
        i. One-to-one evaluation
        ii. Small group evaluation
5. The fifth stage, **Determination**, comprised three steps, i.e.:
    a. Re-revision
    b. Field test
    c. The developed interactive multimedia product for PAK

This developed SAHAT model was a creative innovation combining the orientation to system design with an interactive multimedia learning product. This learning used quality, attractive, and fun interactive multimedia, which summarized the Main Content of Materials (PPIM) and comported with student characteristic and need analyses.

This development model possessed some features, namely:

1. This development model was an innovative and creative product grounded on ADDIE and Pustekom models and Edgar Dale's experiences. It acquired suggestions, direction, and guidance from several education experts and hence was suitable for both beginners and advanced learners.

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2. This development model was equipped with systematical stages and steps which could generate an interactive multimedia design product.
3. This development model provided five clear and simple stages, each described in nine systematical and detailed steps.
4. The SAHAT model, regrettably, required extra and serious thinking as it combined the orientations to the system design and an interactive multimedia learning product.

B. Application Results of the Valid and Practical Interactive Multimedia Design with Potential/Effective Effects

1. One-to-One Evaluation

Prototype 1 test was performed on three students with the criteria of high, average, and low competencies. This test aimed to collect information through observation and interviews related to interactive multimedia learning and documentation related to the practicality of the use of multimedia design among students. It also aimed to identify difficulties possibly found during the use of the product, affording us the information on whether a revision was paramount for prototype 1. We undertook observation, interviews, and a test for this one-to-one evaluation.

Table 1: Observation Results of Prototype 1

No.	Student Name	Descriptor								Score
		D1	D2	D3	D4	D5	D6	D7	D8	
1	FL	1	1	1	1	1	1	0	1	7
2	TW	1	1	1	1	1	1	0	1	7
3	JS	1	1	1	1	1	1	0	0	6
Mean (%)										80.75

Description:

D1: paying attention to the media instruction

D2: proposing a question

D3: enthusiastically and seriously following

D4: putting interest and enthusiastically following

D5: easily understanding

D6: solving the problem

D7: playing

D8: expressing an opinion

Table 1 demonstrates a mean percentage of 80.75%, indicating prototype1 was practical for learning. Table 2 exhibits student learning outcomes in the one-to-one phase. Table 2 points out a mean score of 91, categorized as excellent.

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Table 2: One-to-One Learning Outcome

No.	Student Name	Score
1	FL	100
2	TW	93
3	JS	80
Mean		91

2. Small Group Evaluation

A small group evaluation was carried out to test prototype 2, which was the revised prototype 1. Prototype 2 test aimed to identify practicality and effectiveness. Figure 1 presents the results of the small group's observation of prototype 2.

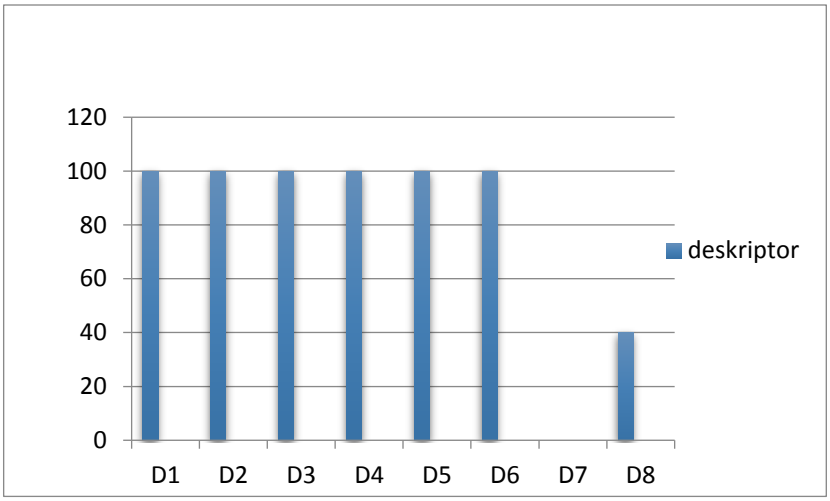

Figure 1: A Bar Chart of the Observation Results of Prototype 2

Description:

D1: paying attention to the media instruction

D2: proposing a question

D3: enthusiastically and seriously following

D4: putting interest and enthusiastically following

D5: easily understanding

D6: solving the problem

D7: playing

D8: expressing an opinion

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Figure 1 shows a score of 80% for prototype 2 from the observation. It signifies the practicality of prototype 2. Figure 2 suggests student learning outcomes in the evaluation stage on the small group for prototype 2. Figure 2 demonstrates a mean score of 84, categorized as **practical**.

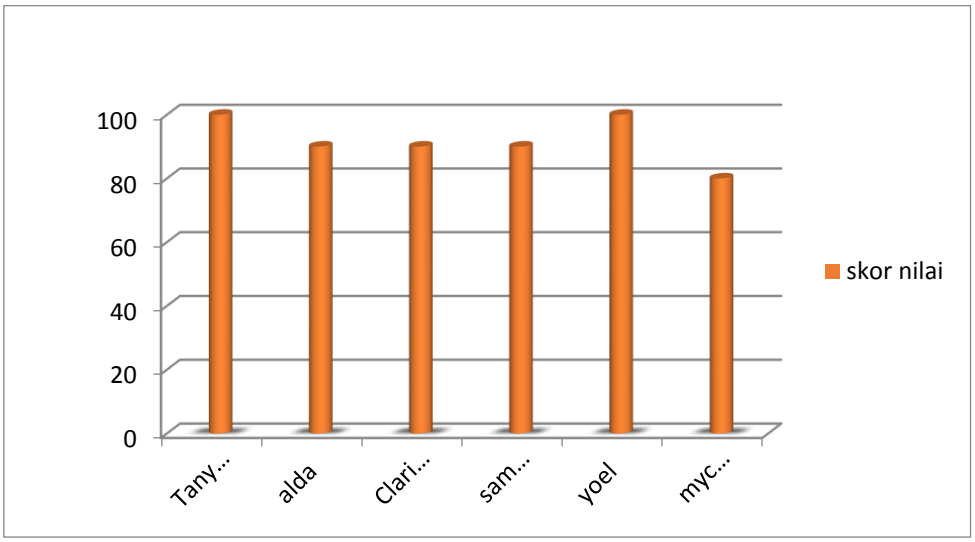

Figure 2: A Bar Chart of the Observation Results of Prototype 2

3. Field Test

a. Observation Results

The observation indicated student activeness in participating in learning activities. Some observation items had percentages categorized as **practical**. Prototype 3, building on student learning outcomes, scored 84% on average. Prototype 3, accordingly, was categorized as **good.**

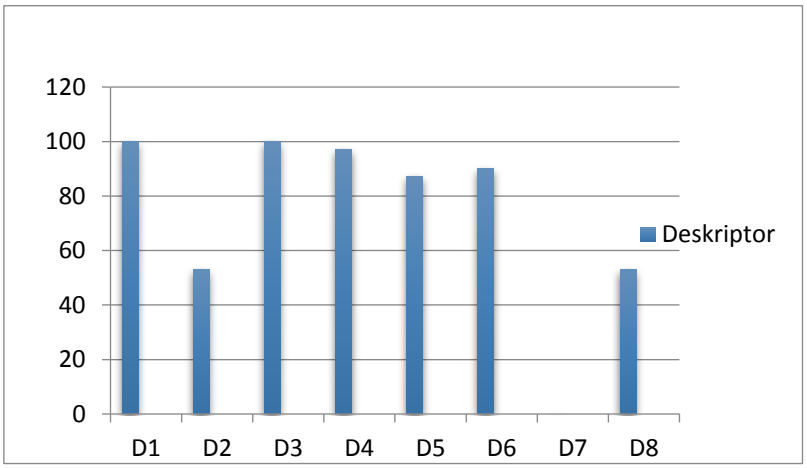

Figure 3: A Bar Chart of the Observation Results of the Field Test

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Description:

D1: paying attention to the media instruction

D2: proposing a question

D3: enthusiastically and seriously following

D4: putting interest and enthusiastically following

D5: easily understanding

D6: solving the problem

D7: playing

D8: expressing an opinion

b. Student Learning Outcome

Student learning outcomes were tested grounded on the difference between pre-test and posttest results. The test aimed to identify what potential effects interactive multimedia had on student learning outcomes and compared student competencies before and after the use of interactive multimedia. Figure 4 presents the pre-test results.

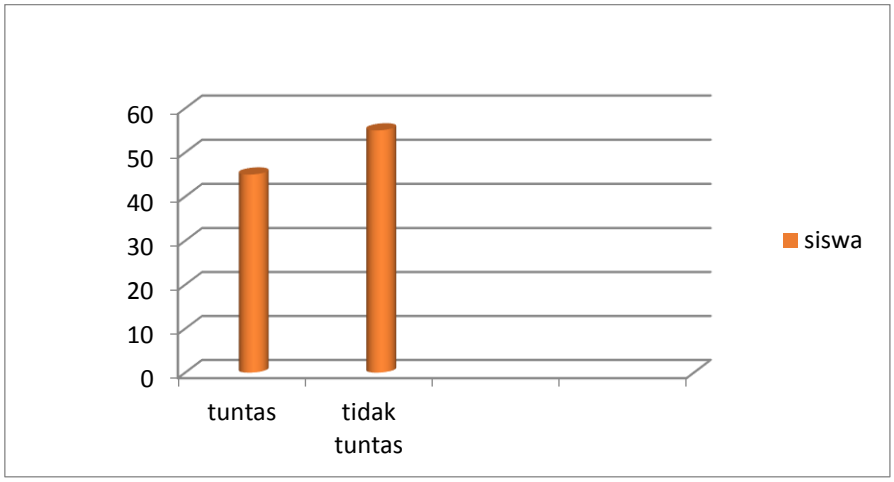

Figure 4: A Bar Chart of Student Learning Outcomes

Figure 4 states 25% of students achieved completeness, whereas 75% did not. Figure 5 suggests student learning outcomes after the use of interactive multimedia.

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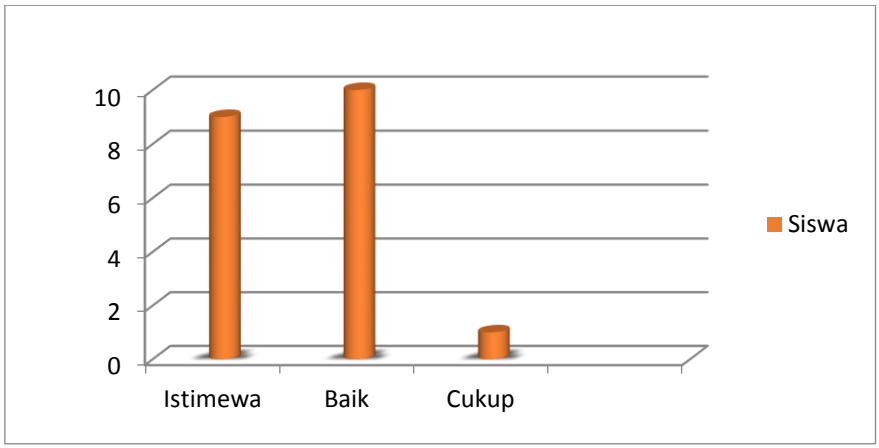

Figure 5: A Bar Chart of Student Learning Outcomes After the Use of Interactive Multimedia

Figure 5 demonstrates nine students scored 93-100 with an **excellent** category, ten scored 80 with a **good** category, and a student scored 70 with an **acceptable** category. As the KKM was 75, 19 students were considered to meeting the KKM or completed, while the other student did not attain completeness. The learning incompleteness was a result of a lack of material understanding because of low thinking skill levels.

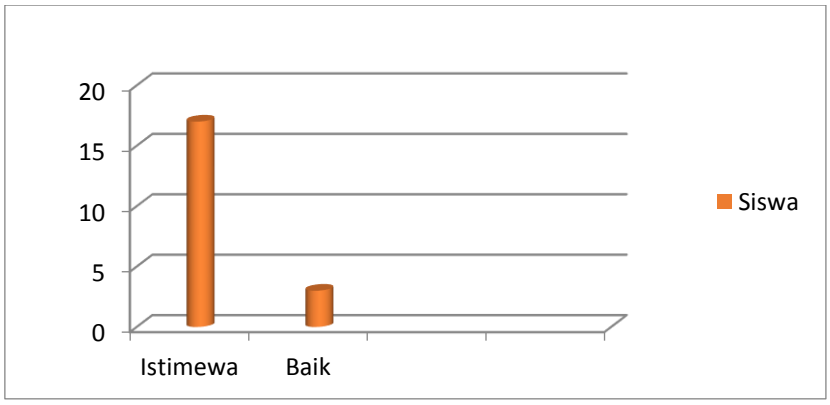

Figure 6: A Bar Chart of Student Learning Outcomes Using Problem Sheets

Figure 6 exhibits that 17 students scored 90-100 with an **excellent** category, and three students scored 80 with a **good** category. Because the KKM was 75, 20 students were considered to reach completeness. It indicated the product tested through the field test had a potential effect on learning outcomes.

DISCUSSION

This research generated a learning model developed on the grounds of ADDIE and Pustekom models and by accommodating Edgar Dale's learning experiences. The generated learning model was the SAHAT model with five stages and nine detailed steps. The first stage was

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Preliminary Study, comprising two steps: Literature Study to determine general objectives and Preliminary Study to collect data. The second stage was **Analysis**, encompassing internal and external analyses. The internal analysis consisted of analyzing PAK competencies and materials, while the external one was analyzing students. An information system analysis related to multimedia information technology was also performed. The third stage was **Harmonization**, including designing steps. This stage required the making of the summary of the Main Content of Materials (PPIM)/flowchart and a storyboard or Electronic Script (PS/NE). The fourth stage was **Application**, made up of two steps, i.e., Expert Validation (VA), composed of content/material, multimedia, and language expert validation, and Evaluation, comprising one-to-one and small-group evaluations. The fifth stage was **Determination**, consisting of three steps, namely re-revision, field test, and the development of interactive multimedia products for PAK.

Prototype 1 from the SAHAT model was evaluated in a one-to-one manner by involving three students. This evaluation resulted in a mean practicality score of 80.75% and a mean score of 91 for learning using interactive multimedia. It brought on prototype 2. Difficulties students faced were regarded as fundaments to revise prototype 1. The one-to-one evaluation led us to the conclusion prototype 1 was good, albeit having some weaknesses in navigation and appearance.

Prototype 2 was evaluated on a small group. We carried out observation and a test on students to identify product practicality and effectiveness. The observation results demonstrated 80% of students faced off no challenges in understanding and using prototype 2 in terms of either its navigation, appearance, or materials. The results were also espoused by student test results, i.e., 84. Those results exhibited prototype 2 was evidently practical and effective.

A pre-test and posttest were conducted as field tests to investigate the SAHAT model potencies. The pre-test results exhibited 25% of students achieved completeness, whereas 75% did not. The posttest, given after the use of interactive multimedia, indicated 95% of students achieved learning completeness (nine students scored 90-100 with an excellent category, and ten scored 80 with a good category).

The valid and practical interactive multimedia learning with potential effects drew student interest through their pictures, animation, texts, videos, and instrumental music. Student interest in interactive multimedia impelled them to actively and diligently learn and prevented them from boredom, improving their learning outcomes.

The results were conforming to some other studies of learning theories. Among the theories was Cybernetic Learning Theory. Cybernetic Learning Theory remarked learning was an information processing activity. The term cybernetic now referred to anything related to the internet, artificial intelligence, and computer networking. Cybernetic Learning Theory regarded the learning process as vital, but the system of the information student would learn was more urgent. Cybernetic Learning Theory also underlined no learning process was ideal for all situations and suitable for all students.

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The results indicated student activities were above 95%, and 100% of student outcomes reached above the school-defined KKM, which was 75. We compared the results with the results from other relevant research, some of which were carried out by Pitrimawati (2011). The results pointed out student activities toward interactive multimedia were above 75%, and 90.32% of students scored above the KKM of 7.0. Anwar (2008) found 88.75% of fourth graders were attracted to interactive multimedia learning to study social science (IPS). Hendri (2010) figured out that the potential effect of interactive multimedia on learning outcomes was 72.2 with a **good** category.

Those relevant research results showed students' good responses or activities towards interactive multimedia. The use of interactive multimedia could also well increase student learning outcomes. Interactive multimedia development related to all discussion topics and courses, as such, needed continuous research.

The learning process should be adjusted to the cognitive development stages students experienced, from learning concrete to abstract materials. This argument was supported by Edgar Dale's media use theory related to the learning process and student cognitive development levels using Dale's Cone of Experience. Dale's Cone of Experience provided a description of the learning experiences students acquired through the process of doing or self-experiencing what was learned, observing, listening using certain media, and listening through language. The more concrete the materials students learned, e.g., through hands-on experiences, the more the experiences they acquired. The use of the interactive multimedia from the SAHAT model became a solution to PAK and promoting learning quality.

The results stated the potential effects of the use of interactive multimedia on student learning activities and outcomes were also inflected by other sustaining factors, such as a computer laboratory facility at Sekolah Dasar Negeri No. 41. The facility allowed students to well receive computer-related materials from the teacher, who was a bachelor in computer, efficiently. Another factor was Sekolah Dasar Negeri No. 41 was located in a strategic area, i.e., the center of the city at Hulondalangi, indicating the students come from medium-income families above. Data collected from 50 students filling out the questionnaire suggested 30 were facilitated with laptops, and most students were facilitated with PCs by their parents at home. Those were some underpinning factors of students' successful interactive multimedia learning. Apart from its strengths, this research possessed some weaknesses, especially in the designing phase, where there were too many materials through competencies, basic competencies, and indicators which had to be developed for elementary school learning. Some improvements were hence required to develop interactive multimedia for PAK for third graders.

CONCLUSION

Interactive multimedia were developed in this research by combining two learning models, namely ADDIE and Pustekom, and accommodating Edgar Dale's learning experiences, resulting in a learning model considered valid based on the validation from material/content, design, multimedia, and language experts. This research generated the SAHAT model composed of five stages, which were **Preliminary Study**, **Analysis**, **Harmonization**,

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Evaluation, and **Determination.** Materials and prototypes were reliable for a test according to the suggestions. That is, they were valid and could act as solutions to Christian Education (PAK) learning, creating quality, fun, and attractive learning which could scale up achievements. The pre-test given prior to interactive multimedia learning unveiled 25% of students achieved completeness, whereas 75% did not. The field test indicated prototype 3 had a potential effect. It was proven by the posttest after the use of interactive multimedia. The test results pointed out that the use of interactive multimedia could augment learning activities, and 95% of the student's attained learning completeness. In conclusion, the interactive multimedia design was effective in elevating student learning outcomes.

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