

Developing Video Tutorial-Based Learning Media to Improve Coaches', Players', and Referees' Understanding of Futsal Laws of the Game

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ABSTRACT:

The understanding of futsal game rules among coaches, players, and referees remains an important issue in competitive futsal, particularly because rule interpretation in match situations often depends on rapid decision-making and accurate perception of incidents. Conventional rule education is generally delivered through printed guidebooks and short technical meetings, which may not provide sufficient visual and situational explanation of complex game incidents. This study aimed to develop and examine the effectiveness of video tutorial-based educational media for improving understanding of futsal game rules among coaches, players, and referees. The study employed a research and development design using the ADDIE model, consisting of analysis, design, development, implementation, and evaluation. The product was validated by a futsal rules expert, a multimedia expert, and an instructional practitioner. The validation results showed improvement in all assessment aspects after revision. Material validation increased from 60% to 92%, media validation increased from 63% to 78%, and learning aspect validation increased from 73% to 94%. The implementation results also showed that the video tutorial improved participants' understanding of futsal game rules, as indicated by an increase in the mean score from 63.53 in the pretest to 93.46 in the posttest. These findings indicate that video tutorial-based educational media is feasible and effective as an alternative learning resource for explaining futsal game rules. The media provides visual examples of fouls, referee signals, restart procedures, and match situations, which may help reduce misinterpretation and support fair play in futsal competitions.

Keywords: performance futsal, video tutorial, educational media, game rules, referee, rule understanding

1. Introduction

Futsal is a fast, dynamic, and high-intensity team sport that requires players to make technical and tactical decisions within limited space and time. The relatively small playing area, frequent transitions, and repeated high-intensity actions make futsal a sport in which technical execution, tactical awareness, and rule interpretation must occur almost simultaneously. Previous research has shown that futsal involves intermittent high-intensity activity patterns and specific physical and physiological demands that distinguish it from other invasion games (Naser et al., 2017). Therefore, mistakes in movement, positioning, or interpretation of the Laws of the Game may quickly influence the flow, fairness, and outcome of a match.

The role of referees in futsal is central to maintaining order, safety, and fairness during competition. Referees are responsible for interpreting game incidents, identifying fouls, managing player behavior, applying disciplinary sanctions, and ensuring that the match is conducted according to official regulations. In futsal, referees must follow the movement of the game from appropriate positions and make decisions within a very short time. This responsibility is demanding because futsal refereeing requires not only physical readiness but also perceptual accuracy, rule knowledge, communication skills, psychological control, and decision-making competence. Studies on elite futsal referees have indicated that refereeing in futsal involves considerable physical and physiological demands, while decision-making performance is also an important component of successful officiating (Ahmed et al., 2017; Rebelo et al., 2011).

However, controversies related to refereeing decisions often occur in competitive futsal. Players and coaches may disagree with referee decisions because they interpret incidents differently, especially in situations involving physical contact, accumulated fouls, handball, free kicks, penalty kicks, or restart procedures. Decision-making in sport officiating is complex because officials must process multiple cues

under time pressure and match-related constraints (Kittel et al., 2021; MacMahon et al., 2007). In this context, disagreement between referees, coaches, and players may occur not only because of decision errors, but also because of differences in understanding how specific rules should be applied in real match situations.

One of the main problems in rule education is that coaches and players often learn futsal rules through printed rulebooks or short technical meetings before competition. Although official rulebooks are essential, textual explanations may not sufficiently illustrate dynamic and contextual incidents that occur on the court. As a result, coaches and players may understand the written rules differently from how the rules should be applied during actual play. This problem is particularly relevant in futsal because several decisions require interpretation of body position, contact intensity, referee signals, and the correct restart procedure. Therefore, rule education needs learning media that can present game incidents visually and contextually.

The use of multimedia learning provides a practical solution to this problem. Multimedia learning theory explains that people learn more effectively when verbal and visual information are presented in a coordinated way, because learners can process information through both visual and auditory channels (Mayer & Moreno, 2003). Video tutorial-based media can present rules through visual, auditory, and situational examples, allowing users to observe specific incidents such as fouls, physical challenges, referee signals, restart procedures, and player positioning. Educational videos are also effective when they manage cognitive load, focus attention on important information, and support active learning (Brame, 2016). Thus, video tutorials can transform abstract rules into concrete examples that are easier to understand.

For futsal, video tutorials are particularly relevant because many decisions depend on the interpretation of match incidents. For example, the difference between legal physical contact and a foul, the correct restart after a violation, the referee's signal for misconduct, or the procedure

for accumulated fouls can be more effectively explained through actual or simulated video footage. Demonstration-based training can help learners understand procedural tasks more clearly when examples are supported by instructional explanations, feedback, and relevant visual cues (Grossman et al., 2013). When coaches, players, and referees view the same video-based examples, they may develop a more consistent understanding of futsal rules and reduce unnecessary conflict during competition.

Previous studies have emphasized the importance of knowledge, experience, perception, and task-relevant cues in referee decision-making. Video-based and web-based training have been shown to improve officiating-related decision-making skills by exposing officials to representative game situations and structured feedback (Put et al., 2013; Schweizer et al., 2011). A broader review of decision-making training in sporting officials also suggests that video-based scenarios remain one of the most commonly used approaches for developing officiating expertise, although training should be designed to represent the real demands of competition as closely as possible (Kittel et al., 2021). These findings indicate that educational media integrating visual examples, rule explanations, and situational analysis may be useful for improving the understanding and application of game rules.

Nevertheless, specific research focusing on the development of video tutorial-based educational media for futsal game rules, particularly for coaches, players, and referees, remains limited. Most previous studies have focused on referee performance, physical demands, or decision-making training in other sports, while fewer studies have developed a structured educational product designed to improve shared understanding of futsal rules among multiple match stakeholders. Therefore, this study was conducted to develop and examine the effectiveness of video tutorial-based educational media for improving understanding of futsal game rules among coaches, players, and referees. The developed media is expected to serve as an

alternative learning resource that complements official rulebooks and technical meetings. By presenting match incidents visually and systematically, the media is intended to help users understand futsal rules more accurately, support referees in rule education, and promote fair play in futsal competitions.

2. Methodology

Study Design

This study employed a research and development design to produce and evaluate video tutorial-based educational media for futsal game rules. The research focused on developing an instructional media product that could be used by coaches, players, and referees to improve their understanding of futsal rules in real match situations. The development procedure followed the ADDIE model, consisting of five systematic stages: analysis, design, development, implementation, and evaluation. The ADDIE model was selected because it provides a structured instructional design process for identifying learning needs, designing instructional materials, developing media products, implementing the product with users, and evaluating its feasibility and effectiveness (Branch, 2009).

The study was conducted in two main phases. The first phase focused on product development and expert validation, while the second phase focused on product implementation and effectiveness testing. The product developed in this study was a video tutorial containing explanations and visual examples of futsal game rules, including fouls, referee signals, restart procedures, penalty situations, accumulated fouls, physical contact incidents, and other match situations that are frequently interpreted differently by players, coaches, and referees.

Research Setting and Participants

The participants consisted of three expert validators and product users representing coaches, players, and referees. The validators comprised one futsal-rules expert, one multimedia expert, and one instructional

practitioner. They were purposively selected according to their expertise and professional experience in their respective fields.

The futsal-rules expert assessed the accuracy, relevance, completeness, and clarity of the content in accordance with official futsal regulations. The multimedia expert evaluated the visual and audio quality, layout, editing, readability, and technical presentation of the video. The instructional practitioner assessed the instructional structure, clarity of explanations, learning sequence, and suitability of the media for its intended users.

The product users comprised coaches, players, and referees actively involved in futsal activities. They were selected because they directly encountered the interpretation and application of futsal rules during training and competition. All participants followed the implementation procedure, which included completing a pretest, studying the video tutorial, completing a posttest, and responding to a user questionnaire.

Development Procedure

The video tutorial-based educational media was developed using the ADDIE model, comprising analysis, design, development, implementation, and evaluation. During the analysis stage, learning needs and common difficulties in understanding futsal rules were identified through preliminary observations and a review of official futsal regulations and relevant literature. The analysis indicated that printed rulebooks and brief technical meetings provided limited visualization of dynamic match incidents. These findings were used to determine the objectives, content, structure, and visual presentation of the video tutorial.

During the design stage, the researchers prepared the learning objectives, instructional structure, storyboard, video script, simulated match scenarios, and assessment instruments. The video was designed to incorporate narration, written explanations, images, diagrams, referee signals, and visual representations of match situations. The content covered referee duties and positioning, referee

signals, fouls and misconduct, yellow and red cards, accumulated fouls, penalty kicks, free kicks, kick-ins, goal clearances, corner kicks, start and restart procedures, physical-contact incidents, referee ethics, and decision-making authority.

During the development stage, match situations, referee signals, fouls, disciplinary procedures, and restart situations were recorded or visually demonstrated. The footage was edited by arranging the video clips, adding narration and explanatory text, inserting diagrams and visual markers, and improving image and audio quality. The initial product was then evaluated during the first expert-validation stage.

The product was revised based on recommendations from the futsal-rules expert, multimedia expert, and instructional practitioner. The revisions addressed regulatory accuracy, visual clarity, audio quality, editing, technical presentation, narration synchronization, instructional structure, and clarity of explanation. The revised product subsequently underwent a second expert-validation stage.

During implementation, the revised video tutorial was administered to coaches, players, and referees. Participants first completed a pretest measuring their initial understanding of futsal rules. They then watched and studied the video tutorial before completing a posttest. Afterward, they completed a user-response questionnaire assessing the feasibility and usability of the media.

Evaluation was conducted formatively and summatively. Formative evaluation involved two rounds of expert validation and product revision. Summative evaluation involved user responses and a descriptive comparison of pretest and posttest scores.

Research Instruments

Three types of instruments were used: expert-validation questionnaires, a user-response questionnaire, and a futsal-rules knowledge test.

The expert-validation instruments comprised three separate questionnaires. The material-

validation questionnaire assessed content accuracy, relevance, completeness, clarity, and consistency with official futsal regulations. The multimedia-validation questionnaire assessed image quality, audio quality, editing, layout, readability, and technical presentation. The instructional-validation questionnaire evaluated instructional clarity, learning sequence, suitability for the intended users, and the usefulness of the media for futsal-rules education. These instruments were administered during the first and second validation stages to identify changes in product feasibility following revision.

The user-response questionnaire consisted of 15 indicators organized into five dimensions. Each dimension contained three indicators:

1. Visual clarity and case examples: image quality, legibility of game rules, and relevance of video footage.
2. Usability: understanding of futsal rules, representation of actual match situations, and accessibility and flexibility.
3. Referee procedures: referee duties and positioning, technical violations, and referee signals.
4. Decision accuracy: decision-making, restart procedures, and analysis of physical-contact incidents.
5. Regulatory accuracy: special rules, codes of ethics and professional attitudes, and referee authority.

The futsal-rules knowledge test was administered before and after participants used the video tutorial. The test assessed participants' understanding of rules commonly applied in match situations, including referee duties, referee signals, fouls and misconduct, disciplinary sanctions, restart procedures,

Data Analysis

The expert-validation and user-response data were analyzed using descriptive quantitative

physical-contact incidents, and referee authority. The participants' raw results were converted to a score ranging from 0 to 100. Equivalent content indicators and scoring procedures were used for the pretest and posttest.

The content validity of the developed media and its evaluation instruments was established through expert judgment involving the futsal-rules expert, multimedia expert, and instructional practitioner. Because the results did not report a reliability coefficient, instrument reliability was not claimed statistically.

Data Collection Procedure

Data collection was conducted sequentially. First, preliminary observations and a literature review were undertaken to identify problems associated with learning and interpreting futsal rules. Second, an initial video tutorial was designed and produced using official futsal regulations and commonly occurring match incidents.

Third, the initial product underwent the first validation stage involving three expert validators. The futsal-rules expert evaluated the material, the multimedia expert evaluated the media presentation, and the instructional practitioner evaluated the learning design. Fourth, the video tutorial was revised according to their feedback and submitted for a second round of validation.

After the revised video had been declared feasible, it was implemented with coaches, players, and referees. The participants completed the knowledge pretest before viewing the video tutorial and completed the posttest after the learning session. Finally, they completed the 15-indicator user-response questionnaire to assess the visual clarity, usability, referee procedures, decision accuracy, and regulatory accuracy of the media.

analysis. The obtained scores were converted into percentages using the following formula:

$$P = \frac{\text{obtained score}}{\text{maximum possible score}} \times 100\%$$

The percentage scores were interpreted using the following criteria:

Percentage	Interpretation
81%–100%	Very feasible
61%–80%	Feasible
41%–60%	Fairly feasible
21%–40%	Less feasible
0%–20%	Not feasible

The changes in expert-validation results were calculated by subtracting the Stage 1 percentage from the Stage 2 percentage. The feasibility of the product from the users' perspective was evaluated separately across visual clarity and case examples, usability, referee procedures, decision

accuracy, and regulatory accuracy. The pretest and posttest scores were analyzed descriptively using the minimum score, maximum score, and mean. Improvement in participants' understanding was calculated by subtracting the mean pretest score from the mean posttest score:

$$\text{Mean improvement} = 93.46 - 63.53 = 29.93$$

Thus, the participants' mean knowledge score increased by 29.93 points after they used the video tutorial. Because no inferential statistical test was reported, the findings were interpreted as evidence of descriptive improvement rather than statistically significant effectiveness.

3. Results

Development of Video Tutorial-Based Educational Media

The analysis stage showed that coaches, players, and referees still experienced difficulties in

understanding futsal game rules when learning was limited to printed rulebooks and short technical meetings. Printed materials were considered less effective because they did not provide real visual examples of match situations. In contrast, video tutorials offered clearer visualization, more realistic examples, and a more engaging learning experience. Therefore, the development of video tutorial-based educational media was considered necessary to improve shared understanding of futsal game rules.

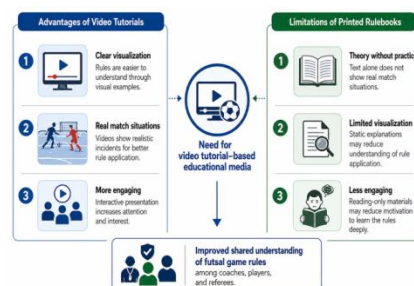


Figure 1. Needs Analysis for the Development of Futsal Game Rules Video Tutorial

Figure 1 illustrates the main rationale for developing the video tutorial-based educational media. The left side presents the advantages of video tutorials, including clear visualization, real match situations, and more engaging learning.

The right side shows the limitations of printed rulebooks, such as theory without practice, limited visualization, and lower learning engagement. These findings indicate the need for video tutorial-based educational media to

improve the shared understanding of futsal game rules among coaches, players, and referees.

The video tutorial was developed based on the ADDIE model. The analysis stage identified the need for visual and practical learning media because printed rulebooks and short technical meetings were considered insufficient to explain dynamic match incidents. The design stage produced the storyboard, script, learning structure, and assessment instruments. The development stage produced the initial prototype, which was then validated by experts. The implementation stage involved coaches, players, and referees as users, while the

evaluation stage was conducted through expert validation, user responses, and pretest–posttest comparison.

Expert Validation Results

Expert validation was conducted to assess the feasibility of the video tutorial from three main aspects: material, media, and learning. The validation was conducted in two stages. The first stage identified several aspects that required revision, while the second stage was conducted after product improvement. The results showed that all validation aspects improved after revision.

Table 1. Expert Validation Results

Assessment Aspect	Validator	Stage 1	Category	Stage 2	Category	Improvement	Assessment Aspect
Material	Futsal rules expert	60%	Fairly feasible	92%	Very feasible	+32%	Material
Media	Multimedia expert	63%	Feasible	78%	Feasible	+15%	Media
Learning	Instructional practitioner	73%	Feasible	94%	Very feasible	+21%	Learning

Table 1 shows that the material aspect increased from 60% to 92%, indicating that the revised content was highly appropriate and aligned with futsal game rules. The media aspect increased from 63% to 78%, showing improvement in visual quality, audio quality, editing, and technical presentation. The learning aspect

increased from 73% to 94%, indicating that the instructional structure, explanation, and learning flow became clearer after revision. The expert validation results showed improvement in all assessed aspects after product revision. The comparison between Stage 1 and Stage 2 validation scores is presented in Figure 2.

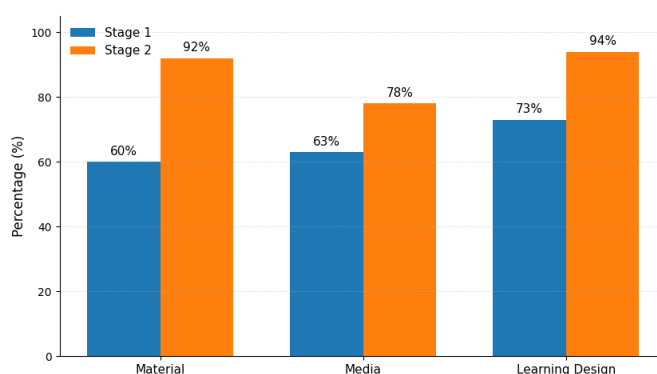


Figure 2. Expert Validation Results before and after Product Revision

Figure 2 shows that all validation aspects improved after revision. The material aspect increased from 60% to 92%, the media aspect increased from 63% to 78%, and the learning

aspect increased from 73% to 94%. These results indicate that the revisions made after the first validation stage improved the quality and feasibility of the video tutorial-based educational media.

Visual Clarity and Case Example Results

The visual clarity and case example indicators were used to evaluate whether the video tutorial presented rules and match situations clearly. The

indicators included image quality, legibility of game rules, and relevance of video footage.

Table 2. Visual Clarity and Case Example Results

Indicator	Interpretation	Percentage	Criteria
Image quality	Media is very clear	93%	Very feasible
Legibility of game rules	Quality visuals	77%	Feasible
Relevance of video footage	Case accuracy	84%	Very feasible
Total		80%	Feasible

Table 2 shows that image quality obtained the highest score at 93%, indicating that the visual display of the media was very clear. The relevance of video footage obtained 84%, showing that the examples used in the video were appropriate to the rules and match incidents being explained. The legibility of game rules obtained 77%, indicating that the text and rule explanations were feasible, although this aspect still required improvement in font size, contrast, or layout. Overall, the visual clarity and

case examples were considered feasible for use in futsal rule education.

Usability Results

The usability indicators were used to assess whether the video tutorial helped users understand futsal game rules more easily. The indicators included understanding of futsal rules, real match situations, and accessibility and flexibility.

Table 3. Usability Results

Indicator	Interpretation	Percentage	Criteria
Understanding futsal rules	Assisted users	90%	Very feasible
Real situation	Referee rules and game situations	82%	Very feasible
Accessibility and flexibility	Learn the rules at any time	93%	Very feasible
Total		88%	Very feasible

Table 3 shows that the usability of the video tutorial was categorized as very feasible, with an overall score of 88%. The highest score was found in accessibility and flexibility at 93%, indicating that the video tutorial allowed users to learn rules anytime and anywhere. Understanding of futsal rules obtained 90%, showing that the media helped users understand the rules more effectively. The real situation

indicator obtained 82%, indicating that the video tutorial was able to represent actual match situations clearly.

Referee Procedure Results

The referee procedure indicators were used to assess whether the video tutorial helped users understand referee mechanics, including referee duties, technical violations, and referee signals.

Table 4. Referee Procedure Results

Indicator	Interpretation	Percentage	Criteria
Duties of the referee	Referee's position in the match	94%	Very feasible
Technical violations	Yellow/red card and accumulated fouls	78%	Feasible
Referee signal	Understanding rules and signals	86%	Very feasible
Total		86%	Very feasible

Table 4 shows that referee procedures were categorized as very feasible, with an overall score of 86%. The highest score was found in the duties of the referee at 94%, indicating that

the video tutorial clearly explained the referee's position and role during the match. The referee signal indicator obtained 86%, showing that users were able to understand the meaning and use of referee signals. Technical violations

obtained 78%, which was categorized as feasible, but this aspect still required more detailed examples related to yellow cards, red cards, and accumulated fouls.

Decision Accuracy Results

The decision accuracy indicators were used to assess whether the video tutorial helped users understand how decisions should be made in specific match situations. The indicators included decision-making, restart procedures, and incident analysis.

Table 5. Decision Accuracy Results

Indicator	Interpretation	Percentage	Criteria
Decision-making	Right after learning the video	83%	Very feasible
Restart procedure	Starting the game after a breach	84%	Very feasible
Incident analysis	Analyzing physical contact and player challenges	87%	Very feasible
Total		84%	Very feasible

Table 5 shows that decision accuracy was categorized as very feasible, with an overall score of 84%. Incident analysis obtained the highest score at 87%, indicating that the video tutorial helped users analyze physical contact and player challenges more clearly. Restart procedures obtained 84%, showing that users understood how the game should be restarted after a violation. Decision-making obtained

83%, indicating that the video tutorial supported users in understanding appropriate decisions after observing rule-related incidents.

Regulatory Accuracy Results

The regulatory accuracy indicators were used to assess users' understanding of specific rules, code of ethics, attitude, and referee authority.

Table 6. Regulatory Accuracy Results

Indicator	Interpretation	Percentage	Criteria
Special rules	Understanding specific match rules	75%	Feasible
Code of ethics and attitude	Assertiveness, neutrality, and self-control	77%	Feasible
Referee's authority	Authority to conduct matches	82%	Very feasible
Total		78%	Feasible

Table 6 shows that regulatory accuracy obtained an overall score of 78%, which was categorized as feasible. The referee's authority indicator obtained the highest score at 82%, indicating that users had a strong understanding of the referee's authority in conducting the match. The code of ethics and attitude indicator obtained 77%, while special rules obtained 75%. These results indicate that although regulatory accuracy was feasible, further strengthening is still needed, especially in the explanation of special

rules and ethical decision-making in match situations.

Pretest and Posttest Results

The effectiveness of the video tutorial was evaluated by comparing participants' understanding before and after using the media. The pretest was administered before participants watched the video tutorial, while the posttest was administered after the learning session.

Table 7. Pretest and Posttest Results

Variable	Minimum Score	Maximum Score	Mean
Pretest	46	100	63.53
Posttest	69	100	93.46

Table 7 shows that the mean pretest score was 63.53, while the mean posttest score increased to 93.46. The minimum score also increased from 46 in the pretest to 69 in the posttest.

These results indicate that participants' understanding of futsal game rules improved after using the video tutorial. The increase in the mean score suggests that the video tutorial-based educational media was effective in helping

coaches, players, and referees understand futsal rules more clearly and practically.

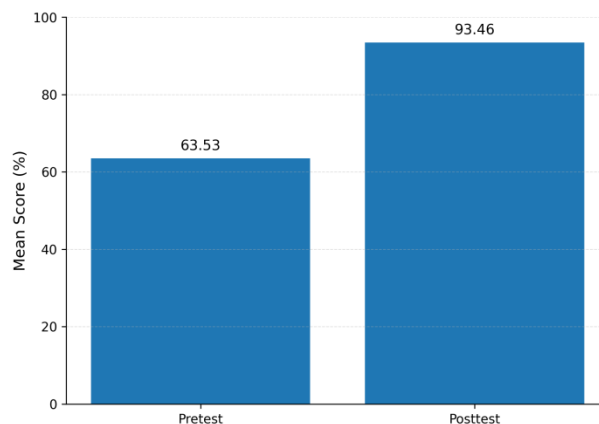


Figure 3. Comparison of pretest and posttest mean scores after using the video tutorial.

Figure 5 shows that the mean score increased from 63.53 in the pretest to 93.46 in the posttest. This result indicates that the video tutorial-based educational media was effective in improving participants' understanding of futsal game rules.

Overall, the results show that the developed video tutorial was feasible and effective as an educational medium for futsal game rules. Expert validation confirmed that the product was appropriate in terms of material, media, and learning design. User responses also showed positive results in visual clarity, usability, referee procedures, decision accuracy, and regulatory accuracy. The pretest and posttest comparison further indicated that the video tutorial improved users' understanding of futsal game rules.

4. Discussion

This study aimed to develop and examine the feasibility and effectiveness of video tutorial-based educational media for improving the understanding of futsal game rules among coaches, players, and referees. The findings showed that the developed media was feasible and effective as an alternative learning resource. This was indicated by the improvement in expert validation scores, positive user responses across several feasibility indicators, and the

increase in participants' mean score from 63.53 in the pretest to 93.46 in the posttest.

The expert validation results showed that the product quality improved after revision. The material aspect increased from 60% to 92%, the media aspect increased from 63% to 78%, and the learning aspect increased from 73% to 94%. These improvements indicate that the revision process strengthened the accuracy of the futsal rule content, the technical presentation of the media, and the instructional organization of the video tutorial. This finding confirms that expert validation is an important stage in educational media development because it helps ensure that the product is not only visually attractive but also accurate, relevant, and appropriate for the intended users.

The need for video tutorial-based media is supported by the nature of futsal rules, which are often procedural and situational. Coaches, players, and referees do not only need to memorize the rules, but also need to understand how the rules are applied in real match situations. This is where video tutorials have a clear advantage over printed materials. Van Der Meij and Van Der Meij (Van Der Meij & Van Der Meij, 2014) found that video tutorials and mixed tutorial formats could produce better learning gains than paper-based tutorials, particularly when the learning task required procedural demonstration. This supports the present study because futsal rule learning also requires users to observe procedures, movements, signals, and decision-making sequences that are difficult to understand through text alone.

The positive results in visual clarity and usability also show that the video tutorial helped users understand futsal rules more practically. The visual clarity indicator obtained 80%, while usability obtained 88%. These findings suggest that users perceived the video tutorial as clear, accessible, and useful for learning. This result is consistent with Noetel et al, who reported in a systematic review that video generally improves learning outcomes in higher education when it is appropriately integrated into instruction (Noetel

et al., 2021). In the context of this study, the video tutorial allowed users to repeatedly observe rule applications, compare different match incidents, and connect written regulations with visual examples.

The design of the video tutorial also appears to support learning by reducing unnecessary difficulty in understanding complex information. Ibrahim et al. emphasized that educational videos become more effective when they use segmenting, signalling, and weeding. Segmenting helps learners process content in smaller units, signalling directs attention to important information, and weeding removes unnecessary elements that may distract learners (Ibrahim et al., 2012). These principles are relevant to the current product because futsal rules involve many technical details, such as accumulated fouls, restart procedures, referee signals, and physical contact interpretation. When these materials are presented in short, focused, and visually guided video segments, users are more likely to understand the rule application clearly.

The usability results also indicate that the media has practical value because users can access the material flexibly. This flexibility is important for coaches, players, and referees who may need to review rules outside formal technical meetings. Guo et al. showed that video design characteristics influence learner engagement in online educational videos (Guo et al., 2014). Although their study was conducted in a different educational context, the principle is relevant: learning videos should be concise, focused, and designed to maintain user attention. In the present study, the video tutorial was considered useful because it presented rule explanations through realistic examples rather than long textual explanations.

The results related to referee procedures and decision accuracy are especially important. Referee procedure obtained an overall score of 86%, while decision accuracy obtained 84%. These findings suggest that the video tutorial helped users understand referee duties, signals, technical violations, restart procedures, and incident analysis. Previous research in sport

officiating supports this result. Mascarenhas et al. found that video-based training improved decision-making accuracy among rugby union referees, especially by helping referees build shared mental models of game situations (Mascarenhas et al., 2005). This finding is highly relevant to the present study because the developed video tutorial aimed not only to improve individual understanding but also to develop shared understanding among coaches, players, and referees.

The importance of visual examples is also supported by studies on perceptual-cognitive skills in refereeing. Spitz et al. showed that elite football referees used more effective visual search behavior when assessing foul play situations, especially by focusing on relevant contact zones (Spitz et al., 2016). This suggests that accurate decision-making in sport officiating depends on the ability to identify and interpret key visual information. In the present study, video tutorial-based learning provided users with visual representations of match incidents, helping them focus on important cues such as body contact, player position, referee signals, and the correct restart procedure.

Decision-making in sport officiating is also influenced by attention under dynamic conditions. Hüttermann et al. found that visual attention is related to decision-making performance in complex dynamic events (Hüttermann et al., 2018). This supports the idea that rule education should not only explain regulations, but also train users to attend to the most relevant information in match situations. In futsal, where decisions often occur within a short time and involve multiple players, video tutorials can help users practice observing critical cues and interpreting incidents more accurately.

The present findings are also in line with the broader use of video and technology to support decision-making in sport. Spitz et al. reported that video assistant referee technology can support decision-making in association football by allowing match incidents to be reviewed more systematically (Spitz et al., 2016). Although

the present study did not develop a match review technology such as VAR, it similarly demonstrates the value of video as a tool for improving interpretation of game incidents. In this study, video was used not to correct decisions during matches, but to educate coaches, players, and referees before or after competition so that they can develop a more consistent understanding of the rules.

The regulatory accuracy indicator obtained the lowest overall score compared with the other indicators, although it was still categorized as feasible. This suggests that special rules, referee authority, code of ethics, and attitude require further strengthening in future product revisions. This finding is important because officiating is not only about applying technical rules, but also about maintaining consistency, fairness, and authority. Björklund et al. showed that reliability and agreement in foul and penalty judgments are important issues among sport officials, especially in fast and contact-based sports (Björklund et al., 2024). Therefore, future versions of the video tutorial should include more detailed examples of special rules, disciplinary sanctions, referee authority, and ethical decision-making.

The increase in pretest and posttest scores provides evidence that the video tutorial improved participants' understanding of futsal game rules. The mean score increased from 63.53 before using the media to 93.46 after the learning session. This improvement indicates that the media helped participants understand the rules more clearly and practically. However, this result should be interpreted descriptively because the available data only include minimum score, maximum score, and mean score. Future studies should report standard deviation, significance testing, normalized gain, and effect size to provide stronger statistical evidence of effectiveness.

Overall, this study contributes to futsal education by developing video tutorial-based educational media that connects written rules with real match situations. The product can complement printed rulebooks and technical

meetings by providing visual, repeatable, and practical explanations of futsal game rules. For coaches and players, the media can reduce misunderstanding and unnecessary protests during matches. For referees, the media can support consistent rule education and improve communication with match stakeholders. Thus, video tutorial-based educational media has the potential to strengthen shared understanding, decision acceptance, and fair play in futsal competitions.

This study has several limitations. First, the effectiveness test was based on pretest and posttest mean scores without more detailed inferential statistical analysis. Second, the study did not include a control group, so the improvement cannot be compared with other learning methods such as printed rulebooks or conventional technical meetings. Third, the product still requires further improvement in regulatory accuracy, especially in the explanation of special rules and ethical decision-making. Future research should involve larger samples, compare video tutorial learning with conventional rule education, and examine whether improved rule understanding can influence actual behavior and decision acceptance during real futsal matches.

5. Conclusion

This study shows that video tutorial-based educational media is feasible and useful for improving the understanding of futsal game rules among coaches, players, and referees. The developed media helps users understand futsal rules more clearly through visual examples of match situations, referee signals, fouls, restart procedures, and decision-making scenarios.

The video tutorial can be used as an alternative learning resource to complement printed rulebooks and technical meetings. It may help reduce different interpretations of futsal rules, improve communication among match stakeholders, and support fair play in futsal competitions.

Future development should provide more detailed explanations of special rules, referee

authority, disciplinary sanctions, and ethical decision-making. Further studies are also

recommended to examine the use of this media in broader futsal competition settings.

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8. Author Declaration

The authors declare that this is original work and no conflicts of interest.