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Socio-science spirituality learning model for cultivating student spirituality and science process skills at Islamic schools

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ABSTRACT

Complementing science subjects with spirituality components is almost universal and is a significant requirement in religion-based schools. However, integrating spiritual components into science classes is challenging, particularly in inquiry-based problem-solving tasks. In this experiment, we modified inquiry learning and contextual teaching. We tested the efficacy of a combined model called the socio-science spirituality (3S) model on students' spirituality and science process skills (SPS). Through a quasi-experiment, this learning model was applied in classes addressing the digestive system, additives and addictive chemicals, and the circulatory system. Following the 3S classroom implementation, we compared the mean pre- and post-test scores of the experimental and control groups using the analysis of covariance (ANCOVA) test and then assessed the relationship between spirituality and SPS in the classrooms using the Pearson-correlation test. The research found that spirituality and SPS were much higher and more prevalent in the experimental group compared to the control group. In the experimental class, there was also a link between spirituality and SPS. Theoretically, this research finding contributes to spiritual education and the development of SPS skills in science classes simultaneously. This research provides a unique way to prioritize the integration of spirituality in science learning. Practically, the research explain the details of the implementation of spirituality that can be applied to inquiry activities in science classes through the 3S model.

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1. INTRODUCTION

Research on spirituality has been ongoing for a very long time and is gaining increasing attention, especially in formal education [1]. Given the 21st century's increasingly complex requirements and difficulties, spirituality must be incorporated into formal education [2]. The complex and changing world has raised interest in students' spiritual growth [3]. In short, spirituality is seen as a crucial dimension of children's education in all cultural contexts around the globe [4].

There is no commonly established and approved definition of spirituality. Spirituality can be interpreted as self-creation when prevalent values are considered [5]. In this study, spirituality is defined as the application of life's meaning and purpose [6], ethics, and moral behavior [7]. Spiritual development is an endeavor to develop faith in God, be truthful, and engage in religious practices [8], [9].

Although studies on the development of spirituality in schools are expanding rapidly, empirical research on enhancing students' spirituality in science classes is uncommon [10]. Thus, education requires an extra "touch of spirituality" to build the positive character of pupils, which will complement their intellectual achievements. Incorporating spiritual values into the educational curriculum can create opportunities for pupils to develop a greater sense of self [11]. By doing so, students' mentality can be better trained, preparing them to face the learning process, and allowing the teaching and learning process to operate more easily [12]. Furthermore, spiritual education can lend significance to the lessons and objectives of the education itself [13]. Consequently, spirituality is an essential aspect of education that must be thoroughly researched following the needs of the times [14], [15].

Classroom instruction is the most effective means of promoting student spirituality [16]. Spiritual teaching consists of learning methods that can assist pupils in attaining a higher degree of consciousness and life significance [17]. In spiritual education, two requirements must be met. First, spiritual teaching practices must be harmonized with Islamic culture. Therefore, all instructional activities must be designed carefully to help students achieve the objective [18]. Second, instruction must align with the goals and significance of a nation's education [19]. Spiritual development is the ultimate purpose of education [20], including in Indonesia.

Previous studies have revealed a positive and significant correlation between spirituality and academic performance [21], [22]. Spirituality has been proven to bolster students' scientific arguments and critical reasoning skills [23]. Spiritual education seeks to teach pupils how to balance logic (reasoning) and strong emotions [16]. Spiritual teaching practices also improve students' cognitive skills and creativity to support other skills needed in scientific investigations [24], [25].

Based on the previous description, it can be concluded that spirituality in education will promote moral values. The absence of spiritual components in science education will diminish the positive potential of humans and encourage the formation of different negative features, such as worry, tension, and other forms of psychological issues [26]. Spirituality is also associated with students' delight in studying and their psychological stability, both of which foster higher classroom performance [27].

To our knowledge, no research has comprehensively evaluated spiritual instruction in science classrooms. Thus, the current study sought to explain the learning mechanisms that can impact the transfer of spiritual conceptions in science education, in light of the necessity of increasing academic achievement and the dearth of spiritual instruction. How student spirituality is fostered and used as a predictor of academic accomplishment, in this case science process skills (SPS), is the focus of this research. SPS is an important skill in carrying out scientific activities [28]. These skills are very important for students to provide direct learning experiences so as to increase the meaningfulness of learning and scientific attitudes [29]. The scientific attitude is closely related to the spiritual because students who are spiritual tend to show an ideal attitude towards their work [30]. Consequently, the main objective of this research was to investigate how spirituality and SPS could be simultaneously enhanced in science classrooms. Moreover, the current study identified suitable learning frameworks for facilitating the development of students' spirituality and SPS. These goals could be attained by integrating science and spirituality in a school lesson plan for "spiritual insights" [11].

Science process skills involves students actively participating in various scientific inquiry methods [31]. We propose an inquiry-based learning model [32] and combined it with the RIAS learning model [33] for the purpose of spiritual development. This study contributes empirically to the relevant literature by examining the efficacy of a combination model, socio-science spirituality (3S), in enhancing students' spirituality and SPS. The findings suggest that the learning model developed offers the incorporation of spiritual values to the development of students' SPS, this is the strength and novelty of this research. The present study also contributes to the spirituality literature by elucidating the mechanisms underlying the development of spirituality and SPS among students. The emphasis on SPS development is a vehicle for researching the potential for spirituality in science learning. For example, according to Starratt [34], religion and science both have the power to influence thinking, opinion, or behavior. In this study, we translate that SPS requires an interdisciplinary perspective, one of which is in the form of spirituality.

Another update, the available research on spirituality and academic performance has only been undertaken in public schools [15], [35], leaving little evidence among faith-based schools where spirituality is regarded as an essential value every student should possess. Although SPS has long been applied to address and investigate scientific issues and problems [36], SPS research related to spirituality is very limited. This lack of research is certainly surprising because scientific and religious issues are often conflated [37]. In other words, there is opportunity for additional research to explore this unique subject field in the context of Islamic schools, as suggested by the existing literature. There appears to be insufficient evidence on the relationship between spirituality and academic performance from religion-based schools in Indonesia. Therefore, the current study attempted to close the knowledge gap.

In short, this study examined the relationship between spirituality and SPS by implementing the 3S model among Indonesian junior high school students in Surabaya, Indonesia. With this in mind, this research

was done in an Islamic educational setting. Spirituality is seen as the essence of daily existence for Indonesians, who are a religious society. It is anticipated that the results of this study would be applicable not just in the Indonesian setting, but also in other countries with religious populations.

2. METHOD

2.1. Design of the study

The present study examined the efficacy of a combined model called the 3S model on students' spirituality and SPS. This study was based on quantitative data [38] collected through a quasi-experimental research design. Two primary factors influenced the research design selection. First, random sampling could not be performed when students merged into a single study group [39]. In other words, this study involved a non-random distribution of students into groups [40]. Second, a control group with equivalent or nearly identical initial abilities would yield excellent results [39]. Thus, this study employed a pre- and post-test non-equivalent control design to evaluate students' spirituality and SPS. The experimental group in this study received an intervention known as 3S learning, whereas the control group engaged in conventional learning. Both groups were given a pre-test before training and a post-test following training (3S and conventional learning).

2.2. Participants

The study group was made up of 154 eighth graders between the ages of 12 and 14. There were 75 students in the experimental group and 79 students in the control group. The two groups attended a private Islamic school in Surabaya, Indonesia, for the 2019-2020 school year. The selection of this school was based on convenience considerations, as the school granted full authorization for this study and parents provided support. Hence, we could trace students' academic and spiritual progress at this institution over an extended period.

2.3. Instruments

The dependent variables of this research include spirituality and SPS. Students' spirituality is measured using a scale, while SPS are measured using tests. Both are given to students in Indonesian.

2.3.1. The spirituality scale

The spirituality scale (SS) used to evaluate participants' spiritual attitudes contained 134 items. The SS used in the current study was modified from Dasti and Siwat [41]. The scale covers eight aspects as: i) self-discipline, "*I am able to carry out well-planned work*"; ii) the search for divinity, "*I feel an urge to get to know my Creator*"; iii) friendliness and expansive behavior, "when I get together with friends, I will exchange ideas with them"; iv) pride, "I am afraid of being arrogant because of the qualities I have"; v) feeling connected to God, "I feel that seeking the (divine) truth is the right thing to do"; vi) cruelty-generosity, "I try resolving debates between relatives/friends"; vii) tolerance-intolerance, "I meet people who have serious disagreements with me"; and viii) Islamic practices, "I am patient and persistent in following the spiritual path."

The eight aspects were available in positive and negative statements. The spiritual scale employed a five-point Likert scale, ranging from strongly disagree to strongly agree (1-5). The score inverse applied to negative statements. This scale had undergone an expert validation process before being tested on students to measure its empirical validity. The Pearson correlation test findings indicated that the r-calculated value was between 0.268 and 0.566 (p-value 0.05) and the Cronbach alpha (α) value was 0.921.

2.3.2. Science process skills test

The SPPS test used in this study consisted of 37 multiple choices: 10 questions on the digestive system, 12 questions on additives and addictive substances, and 15 questions on the circulatory system. This instrument was developed based on the SPS indicators suggested by Harlen [42] which include: i) observing; ii) asking questions; iii) making hypotheses; iv) predicting; v) planning and investigating; vi) interpreting; and vii) communicate. Three education specialists were invited to examine the SPS test (expert validation). The expert validation process was followed by empirical validation. Results were examined for item discrimination power, difficulty level [43], and reliability using Cronbach alpha [44]. The results showed that each test item had a discrimination power of 0.275-0.727. Most items (23 items) were in the "medium" difficulty level. The α value for the test was 0.70. Thus, the instrument was declared valid and very reliable. An example of the test items measuring the "asking questions" indicator is presented as:

The standard blood group system is represented by the letters A, B, and O. Information on the human blood group system is essential for blood transfusions and criminal investigations. If a clot forms when a person's blood is mixed with serum agglutinin A, it is possible that the person has blood type A or AB. If the blood does not clot, the person probably has blood type B or O. If a clot forms when tested with serum agglutinin

B, it is likely that the person has blood type B or AB. Yet, if it does not coagulate, the person may have blood type A or O. The following are questions can be used to identify problems based on the discussion, except....
A. Why does everyone have a different blood type?
B. What is the function of the human blood grouping system?
C. When the blood of a person with blood type O is mixed with agglutinin A serum, what reaction occurs?
D. When the blood of a person with blood type AB is mixed with agglutinin B serum, what reaction occurs?

2.4. Data collection procedures and research intervention

Biology topics including the human digestive system, additives and addictive substances, and the circulatory system were taught in the experimental and control classes between August and December 2019. In the experimental class, learning was conducted utilizing the 3S model, which consisted of five stages of group-based learning activities. The initial phase was *issue orientation*. This phase introduced students to contemporary socio-scientific issues, such as the prevalence of stunting in Indonesia. At this stage, pupils were instructed to read an article about disorders resulting from an unbalanced diet. After reading the article, students were instructed to answer some questions to identify the problems. The questions were "*Are the nutritional needs of each individual the same?*", "*Are there differences in nutritional requirements between adults and children who are still growing?*", "*What factors influence a person's energy requirements*?"

The second stage of 3S learning consisted of data investigation or extraction. During this phase, participants conducted observations, participated in practicum activities, and analyzed socio-scientific issues. In one practicum, participants evaluated food nutrition and analyzed stunting issues in Indonesia. Students presented the outcomes of their investigation in the form of a short-written report. Then, at the third stage, sharing, one member of the group presented the outcomes of their group discussion to the class and the other groups provided feedback on the presentation. At this point, students presented their papers in turn. Students were challenged to demonstrate tolerance, generosity, and emotional control during this activity when confronted with opposing viewpoints. This stage aimed to teach students how to humbly accept their peers' objections, input, criticism, or questions.

The fourth phase of 3S learning was evaluating. At this point, the teacher asked participants to review the answers to the questions posed in the orientation phase and to compare their assumptions with the investigation's findings. Students reflected on the entire learning process at the fifth stage. The instructor asked students to consider Islamic principles on determining food quality and halal status. Allah SWT declares in the Al-Quran that halal food and drink are excellent for all Muslims to consume. The instructor then inquired about how the students felt after completing the reflection. The teacher permitted pupils to express their views on what actions to take in everyday life in respect to the subject learned and the appropriate spiritual attitudes.

2.5. Data analysis

Before inferential analysis, descriptive statistics were applied to the collected data, yielding results in mean (M) and standard deviation (SD). Analysis of covariance (ANCOVA) was utilized at a 5% significance level to examine the difference between the experimental and control groups in this investigation. Before conducting ANCOVA, the data were examined for normality using the one sample Kolmogorov-Smirnov test and for homogeneity using the Levene's test of equality of error variances. The normality test results on spirituality pretest and posttest data showed a Z value of 0.809 (p=0.530) and 0.870 (p=0.436), while the pretest and posttest data of process skills showed a Z value of 0.730 (p=0.661) and 1.071 (p=0.201). Meanwhile, the calculation of the homogeneity test on the SPS data shows the value of F=2,413; p=0.052, and spirituality shows a value of F=0.784; p=0.602. In addition, the Pearson correlation coefficient was calculated to examine the relationship between spiritual attitudes and SPS in the experimental group which implemented the 3S learning model.

3. RESULTS

3.1. Spirituality

At the end of the learning session, the spirituality of the experimental group experienced a slight increase from 68.98 (SD=6.21) to 72.19 (SD=6.20). On the other hand, the control group's spirituality did not experience any change at all; their mean score remained constant at 69. Thus, the 3S model had a beneficial effect on pupil spirituality. The ANCOVA revealed that the experimental group was significantly different from the control group (F=6.887, p=0.000) in six indicators of spirituality (at the 5% significance level). However, the experimental and control groups did not differ significantly in two spiritual indicators, friendliness and expansive behavior (the second indicator) and Islamic practices (the eighth indicator). Table 1 displays the ANCOVA results for each spiritual indicator evaluated.

Table 1 The ANCOVA results of students' spirituality

Aspect	Experimental				Control				F
	Pretest		Post-test		Pretest		Post-test		
	M	SD	M	SD	M	SD	M	SD	
Self-discipline	81.84	10.49	86.21	10.40	82.01	13.34	82.16	14.27	4.140*
Search for divinity	54.89	4.97	59.83	6.97	57.72	7.65	58.20	6.35	5.335*
Friendliness and expansive behavior	66.60	9.73	68.21	9.83	66.85	10.28	67.11	11.90	0.612
Pride	67.40	10.92	70.91	8.25	69.37	9.70	68.71	12.19	4.060*
Feeling connected to God	81.36	8.77	85.03	9.35	79.56	7.29	80.38	11.13	6.598*
Cruelty-generosity	38.72	5.19	38.79	4.38	36.87	5.98	36.11	6.66	6.388*
Tolerance-intolerance	41.43	6.32	44.01	6.42	42.43	7.12	41.41	7.52	7.878*
Islamic practices	28.81	5.54	30.67	4.62	27.37	6.00	30.34	5.37	0.000
Total	68.98	6.21	72.19	6.20	69.98	6.21	69.32	8.56	6.887**

Note. **p-value <0.01, *p-value <0.05

3.2. Science process skills

According to the analysis results, participants' initial SPS did not differ significantly, with M=37.12 (SD=2.83) for the experimental group and 35.61 (SD=2.98) for the control group. However, after implementing the treatment (3S learning model), the experimental group achieved a significantly higher final SPS than the control group (M=79.66; SD=1.92 vs. M=60.60; SD=2.30). The ANCOVA results revealed a significant difference in SPS between the experimental and control groups (F=303.682; p 0.0001). In other words, the 3S model could promote students' SPS. The two treatment groups exhibited substantial differences in observing, asking questions, predicting, interpreting, and communicating. However, the ability of the experimental group in making hypotheses (third aspect) and making plans and investigations (fifth aspect) was not significantly different from that of the control group. Table 2 displays the ANCOVA results for each SPS indicator evaluated.

Table 2. The ANCOVA results of students' SPS

Aspect	Experimental				Control				F
	Pretest		Posttest		Pretest		Posttest		
	M	SD	M	SD	M	SD	M	SD	
Observing	22.00	0.64	72.00	0.62	24.00	0.62	56.00	0.73	10.415**
Asking questions	48.00	1.01	78.67	0.69	29.67	0.94	56.56	0.78	38.471**
Making hypotheses	52.00	0.50	68.00	0.47	37.33	0.49	60.00	0.49	1.250
Predicting	38.13	1.03	84.27	0.76	35.20	0.93	66.67	0.81	50.360**
Planning and investigating	17.33	0.38	65.33	0.48	22.67	0.42	53.33	0.50	2.306
Interpreting	39.70	1.34	80.59	1.15	37.04	1.53	60.59	1.35	72.800**
Communicating	33.04	1.17	81.19	1.42	40.89	1.31	60.89	1.35	71.136**
Total	37.12	2.83	79.66	1.92	35.61	2.98	60.60	2.30	303.682**

Note. **p-value <0.01, *p-value <0.05

3.3. Relationship between spirituality and science process skills

The results of the Pearson correlation analysis showed that spirituality has a strong and positive relationship with SPS (r=0.236; p value=0.000). Higher levels of spirituality correlate with higher levels of SPS, as shown in Figure 1.

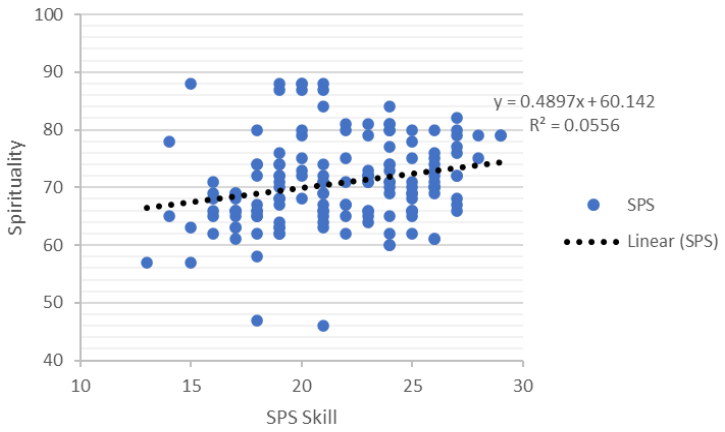

Figure 1. The correlation between spirituality and SPS

4. DISCUSSION

This study makes significant contributions to the body of knowledge. This work improves the literature on learning models to enhance spirituality and SPS. It also provides insights into the relationship between spirituality and SPS via the 3S learning model. Showing how the 3S model could positively affect spirituality and SPS can indirectly reconcile earlier literature on learning that focused less on spirituality and science. The current study, however, cannot clearly explain how and why student spirituality can lead to positive SPS outcomes, or vice versa.

According to our knowledge, the present study is the first attempt to document the effect of 3S learning on spirituality and SPS. The current study provides strong empirical evidence that the 3S model can promote spirituality as shown in Table 1, which can also increase SPS as shown in Table 2. The present study showed the mechanisms underlying how 3S learning could have multiple positive effects on students' learning outcomes. This study's results indicated that a combination of exploration and problem-solving [32] and spirituality-related reflecting activities [33] could affect students' spirituality and SPS. As anticipated, the 3S model could enhance students' spirituality and SPS, and mediate their relationship through five stages of learning: problem orientation, investigating, sharing, evaluating, and reflecting.

Based on the 3S learning phases, we postulate that investigating activities to solve problems can facilitate the development of students' SPS. This finding is corroborated by a number of prior investigations with comparable findings [45]–[48]. The investigating phase trains students to ask questions and make predictions. Creating scientific questions will aid in the development of pupils' cognitive processes and aid in focusing their attention [49]. Research indicates that inquiry activities strongly support the growth of students' data interpretation skills [50].

The analysis of each SPS component in this study also demonstrated the advantages of 3S learning model' sharing phase. This finding is confirmed by past studies indicating that inquiries in scientific education will boost students' SPS [51]–[53]. At the sharing stage, students exchange ideas and arguments through discussion activities [54] allowing them to practice confidently communicating their views to discover new information [55]. In several cases of Islamic education, it is emphasized that there is a need for more interactive learning containing investigation and sharing. Furthermore, this activity can equip students to have adequate skills to answer the essential questions they encounter [56]. In other literature, it is explained that education in Islamic schools must refer to basic ideas that emphasize the importance of critical thinking and the involvement of investigative pedagogy [57].

In addition, we postulate that during the reflecting stage, students had time and space for in-depth learning that could assist them in cultivating meaning-making and differentiating their past attitudes [58]. Reflecting is one of the contemplative techniques that can promote pupils' spiritual growth in the classroom [59]. Empirical research has shown that reflective thinking can enhance focus and reduce stress [60]. Waghid [57] explained that so far, education in Islamic schools has been associated with accepting uncritical facts and confusing students' opinions. Through this reflex approach, students will be able to develop a critical attitude and question the good things they learn and what needs to be avoided. This 3S model provides an urgency to include interaction and critical reflection so that students have a stronger spiritual structure [61].

Spiritual development is promoted by narrative pedagogy, where learners are encouraged and supported to develop their meaning-making, while maintaining a purposeful and constructive relationship with the teacher [20]. Zohar [62] proposes some fundamental principles that underpin significant constructions in the development of spirituality, namely the celebration of diversity to respect and accept others with differences, humility to accept when one has erred, and the propensity to ask questions to discover things in greater detail. According to meta-construct analysis, the 3S model contains cognitive, academic, behavioral, and emotional components [63]. The 3S learning model offers a place for reflection that allows students to feel more deeply [64], regulate emotions, and integrate all aspects of self-perception and life experiences into learning [60].

By combining two existing learning principles, we have initiated a simple new mechanism or way to increase student spirituality and SPS. By using the inquiry technique and the RAIS learning model, we were able to study the impacts of the 3S model on students' spirituality and SPS and fill gaps in the relevant literature. Unquestionably, our findings contribute to the literature on enhancing spirituality in science classrooms. In addition, this is the first study to investigate how the 3S can affect students' SPS. We also offer a variety of classroom spiritual development strategies. This study concludes by introducing spirituality as a significant component impacting students' learning skills. Although many studies have proven a good relationship between religion and academics, this study implies that the development of SPS requires a spiritual outlook. We might theorize that spirituality provides resources for SPS development within the context of the 3S learning model, an inquiry-based and contextual teaching and learning (CTL) strategy.

This research also uncovered a substantial correlation between students' spirituality and SPS. The Pearson correlation analysis demonstrated a significant positive relationship between spirituality and SPS as shown in Figure 1. This finding is consistent with earlier research that suggests that spirituality has a

favorable association with academic achievement, mainly because spirituality helps students maintain a sense of purpose and deal with stressors [22], [65]. Spirituality can improve the internalization of positive ideals [66] which helps pupils maintain social networks in efforts to solve problems. Faith (representing spirituality) and science classes (representing SPS) are intimately related; therefore, religion can be included into the teaching and learning process in the classroom [65], [67].

By proving the relationship between spirituality and SPS through the 3S model, we urge schools and teachers to utilize this model more frequently in science education. Our findings suggest the importance of incorporating aspects of spirituality to achieve a more holistic understanding of the current and potential students' knowledge and skills. In conclusion, the 3S learning model can be utilized in the classroom to foster spirituality and SPS. The current study's findings have significant implications for students, parents, and educators in Islamic-based schools. Spirituality is viewed as a vital learning resource; thus, children should be encouraged to explore spiritual resources and discover actions that teach them gratitude. Second, students ought to be exposed to educational initiatives that cultivate thankfulness and spirituality. Teachers must educate children on the significance of positive character and its impact on school spirituality. Finally, teachers, parents, and schools must constantly evaluate students' learning environment and academic progress. Hence, they can select which qualities of appreciation and spirituality students must learn. Especially for parents, it is necessary to provide warmth and provide autonomy support related to the decrease in students' spiritual struggles as a whole [68].

This study has several limitations. First, spirituality has multiple definitions, and is said to be very dependent on culture [69] or in other words, culture has a significant impact on spirituality. Schools in Indonesia, particularly those on the island of Java, whose culture and religion are primarily assimilationist, may be more accepting to spiritual expressions than schools in other regions. This variation in acceptability can have various consequences on students' learning outcomes following the implementation of the 3S model. Indonesian culture places a greater focus on interpersonal interactions and harmony, therefore students in Indonesia will likely devote a significant deal of attention to spirituality. Second, our research demonstrates that spirituality is crucial in fostering the development of students' SPS. Thus, future research examining this topic must consider the culture and background of students as the covariate. Students who participated in this study had a spiritual foundation based on Islam. Indonesia's culture is diverse, although most of its people adhere to Islam. Hence, the meaning of spirituality in this study may differ from the perspective of spirituality in other religions. More generally, the perspective of spirituality in Indonesia will differ from that of spirituality in nations where Islam is not the primary religion. We anticipate different outcomes if the 3S learning model is applied to a sample of students from different religions or areas. The last, this study identifies meaningful learning as an essential part of the educational environment, yet the SS utilized solely addresses self-creational spirituality. Ergo, future research should investigate additional spiritual learning components strongly associated with SPS or other academic skills. We propose that future studies investigate the causal relationship between spirituality and SPS at the individual level. We propose that spirituality functions as a personal resource that contributes to the growth of SPS.

5. CONCLUSION

This research explains the fundamental process of the 3S learning model. It demonstrates that the 3S model can enhance students' spirituality and SPS, and that these two variables have a strong and positive correlation. This study extends earlier research on spirituality and student accomplishment by demonstrating that spirituality significantly predicts student achievement in SPS. It cannot be denied that combining an inquiry approach that promotes SPS with the concept of spirituality in the context of CTL would create a new landscape to improve the learning process in Islamic-based schools. The integration of reflection exercises and Islamic values generates scientific learning that draws pupils closer to God. This study also indicates that non-religious academics have widely adopted spirituality in education to improve student learning and skills.

From a practical perspective, this study emphasizes spirituality as essential in developing an enjoyable learning environment. We attempt to introduce the 3S model as a novel technique for strengthening students' spiritual attitudes toward science learning. The current research provides schools and teachers with crucial insights for teaching students with an intrinsic desire to acquire spiritual attitudes.

Given the expanding body of data, including this study and several other studies, we conclude that student spirituality significantly affects academic accomplishment. Thus, schools and teachers must prioritize the development of students' spirituality. Science students must be encouraged not merely to seek scientific information and skills, but also to seek extra value from a religious perspective. To urge students to engage in improved quality of learning and build good spirituality, schools must promote hospitality and religious practices, as there is no substantial difference between these two factors. In general, education in Islamic schools primarily aims to help students develop a relationship with Allah and ensure consistency. In accordance with the conclusions of this study, fostering spirituality in the educational setting begins with improving the

relationship with God. Teachers can construct a set of learning tools that stress the importance of spirituality by, for example, modifying the 3S model, which has been shown to foster a science-integrated learning culture. Thus, our research aids educators in assisting students to attain more spiritually competent learning outcomes.

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