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Digital Learning for Religious Moderation: Assessing the Impact of MOOCs on Understanding *Wasathiyah Islam*

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Abstract

This study examines the impact of Massive Open Online Courses (MOOCs) in improving students' understanding of *Wasathiyah Islam* (Moderate Islam), a concept that calls for balance and moderation in Islamic teachings. With the growing number of incidents of religious extremism and intolerance, the issue of religious moderation has become prominent, as it is a basis for promoting tolerance, peace and cooperation among diverse communities. However, there is a lack of empirical research investigating the impact of online learning, like MOOCs, on promoting religious moderation. To fill this gap, this study applied a quantitative approach using pretest and post-test analysis to measure participants' knowledge enhancement. The results showed a significant improvement in students' understanding, with a pretest logit score of 0.63 increasing to a post-test logit score of 4.45. The Wilcoxon Signed Rank Test validated a statistically significant improvement: $Z = -4.675, p < 0.001$, even though with a high standard deviation (SD) (i.e., the dispersion was relatively high, which indicated that most students' comprehension levels vary). This improvement score confirms the effectiveness of the MOOC in enhancing students' understanding of *Wasathiyah Islam*. Further, data based on the Likert scale indicated mean scores increasing from 31.81 to 43.03, with 28 out of 32 showing improvement. These findings underline the potential of MOOCs as strong tools for strengthening religious moderation and suggest that through e-learning, societies could be more knowledgeable and peaceful, thus overcoming most of the current challenges of intolerance and extremism.

Keywords: *religious moderation, Wasathiyah Islam, digital learning, MOOCs.*



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Introduction

Wasathiyah Islam, also known as "moderate Islam" in the English language, is a fundamental principle of balance and justice in Islamic teachings, which is to ensure the moderate practice of religion (Kamali, 2015). This is the basic concept that comes from the Qur'an and the Sunnah, in which Muslims are urged to keep the middle path and not to be extreme in their faith and practices (Mohamed, 2018). These principles are crucial in current society, where religious fanaticism may lead to chaos in interfaith relations and social harmony. Inculcating core values (for example, tolerance, compassion, and mutual understanding) in *Wasathiyah Islam* would act as the main objective for every Muslim to have a positive engagement with others, and thus, the feeling of unity and sharing of humanity would be guaranteed (Azisi *et al.*, 2024). This Islamic teaching is designed to show how important the approach of moderation is. Thereby, it highlights the human dimension, shrinking the essence to overall inclusivity and allowing for the inclusion of different thoughts or practices in the Islamic tradition.

The significance of religious moderation, especially in the current polarized world, can be emphasized by fostering a balanced approach to religion. *Wasathiyah* urges Muslims to be open-minded, embrace dialog and cooperation with people of different beliefs, and not be exclusive (Kamali, 2015). This can promote internal cohesion within the Muslim community, and lead to a peaceful environment in society at large (Muslih, 2023). Education with the incorporation of *Wasathiyah* principles into their curriculum will shape the future generations' view about Islam as a peaceful and moderate religion (Andi *et al.*, 2023). In essence, *Wasathiyah Islam* is a practical endeavor, as it brings out a positive aspect of faith showing Islam's ability to live in harmony with others and, at the same time, its respect for diversity.

Education is one of the fastest-growing sectors of digitalization, breaking down geographical and financial barriers to participating in a

variety of educational programs. The internet and advancements in technology brought new forms of online learning other than the traditional educational models in the classroom setting, incorporating online platforms that enable learning to take place anytime and anywhere (Haleem *et al.*, 2022). Massive Open Online Courses (MOOCs) have emerged as the most significant part of the digital revolution, offering a variety of courses from prestigious institutions to students across the globe (Knox, 2015). In this way, MOOCs remove both geographical and financial barriers, leading to democratization in education, making high-quality educational resources accessible to students from diverse backgrounds (Shapiro *et al.*, 2017). According to Kizilcec *et al.* (2013), the transformation in education helps enhance the learning experience, creating an environment of lifelong learning in which one would continually update one's knowledge and skills within a continuously changing job market.

Moreover, the role of MOOCs does not stop at making education accessible but also fosters pedagogic innovation with different learning styles accommodated. Montgomery *et al.* (2015) stated that most of the MOOCs are interactive, including discussions, quizzes, and peer assessments that keep students more involved in engaged and collaborative learning with relevance to modern-era learning. Additionally, the data resulting from MOOC platforms is of great significance for gaining insights into students' behavior and preference, thus helping instructors develop better teaching and course design strategies (Yu, 2024). A great number of universities have already begun to host learning through MOOCs within their curriculum, recognizing that MOOCs could complement traditional teaching with digital resources, emphasizing above all flexibility and participation, but most importantly, the need for adaptability to the different needs of learners.

The integration of *Wasathiyah Islam* into Massive Open Online Courses holds great promise in addressing contemporary problems such as the spread of extremism and religious intolerance. *Wasathiyah*, which

underlines the principles of moderation, balance, and tolerance of Islamic teaching, can act as a basis in developing course content aimed at promoting mutual understanding and coexistence among different religious communities (Hassan, 2014). By integrating *Wasathiyah* principles, educators are able to provide learners with an in-depth understanding of Islam, countering radical interpretations of religious sources and promoting a culture of peace and dialog. It prepares not only students to be critically engaged with extremist ideas but, more importantly, to be inspired by the values of mercy and dignity towards others central to *Wasathiyah* (Mohamed, 2018). This puts MOOCs in a perfect place to bring these values to a wider global audience and thereby contribute to greater harmony within society.

In these ways, the flexibility and interactivity of MOOCs serve as an ideal pedagogical environment in which the course can introduce the learner to *Wasathiyah Islam* speaking to the modern world. MOOCs use various means, including multimedia tools, interactive discussion forums, and collaboration opportunities for active learning; in fact, an enabling environment is provided for the participants to immerse themselves in reflecting on the values of moderation in Islam as presented to them (William *et al.*, 2018). This approach has the potential to challenge existing stereotypes and misconceptions about Islam, helping students from diverse backgrounds develop a more accurate and empathetic understanding (Elamin, 2024). Additionally, the global accessibility of MOOCs facilitates cross-cultural exchanges, enabling participants to engage in meaningful dialogs on religious moderation by sharing perspectives and experiences. This will help resolve such problems as extreme attitudes and intolerance, simultaneously building up an open and friendly world.

Considering the more general trend in the last decade to use MOOCs regarding a great many varied academic disciplines, a deeper reflection upon how that informed and framed one's perception about religious moderation, as in this case, with a specific focus on *Wasathiyah*

Islam, has developed somewhat incompletely to this day. Whereas existing studies indicate that MOOCs are effective in developing knowledge and skills related to school subjects, there is a lack of empirical evidence regarding their impact on the understanding of religious principles and values among students (Gilliat-Ray *et al.*, 2020). Such a shortcoming is critical, above all in light of present societal need, which is about religious moderation as one way of resisting extremism and, at the same time, one tool for social unity within multicultural communities.

Investigation of whether MOOCs can teach the principles of *Wasathiyah Islam* effectively can be viewed as the first step in forming educational programs that are based on the most pressing threats, such as religious intolerance and radicalization (Andi *et al.*, 2023). This research aims at discovering the students' ideas about the moderate Islamic teachings of *Wasathiyah Islam* when they become involved in a MOOC on the subject. The results at the end of the day are projected to unveil how MOOCs can be used as a vital tool for the promotion of peace and moderation that conform to the Islamic teachings.

Research Questions

As described previously, this study aims to examine the effect of participation in the *Islam Wasathiyah* course, especially in terms of students' understanding. To guide this study, there are two research questions stated, namely:

1. Is there any statistically significant difference in students' understanding regarding *Wasathiyah Islam* before and after completing the course in MOOC?
2. What is the distribution of changes in students' individual abilities in understanding *Wasathiyah Islam* after completing the MOOC?

Literature Review

This literature review embraces a wide range of previous studies related to the tenets of *Wasathiyah Islam* and its application in social settings. This section discusses Massive Online Open Courses within the field of religious education and their potential in educational undertakings. The review systematically analyzed this point of contact between religious moderation and digital learning theories as a grounding element of the research.

Wasathiyah Islam

Wasathiyah, an important foundation of Islam, is moderation, balance, justice, and tolerance in all matters of life. Stemming from the Quran and Hadith, this principle calls for a middle path that avoids extremism and allows peaceful coexistence among diversified communities (Kamali, 2015). The mutual concepts included in recognition (*ta'aruf*), moderation (*tawasut*), tolerance (*tasamuh*), uprightness (*i'tidal*), and balance (*tawazun*) carry substantial significance for nurturing social harmony, alleviating conflicts, and facilitating peaceful interactions (Kementerian Agama Republik Indonesia, 2019). Through the advancement of these principles, *Wasathiyah* plays a pivotal role in establishing cohesive communities that honor differences, which in turn diminishes discord and promotes unity.

The political application of *Wasathiyah* has been especially in evidence in Malaysia, where it has facilitated national unity and political stability (Mujani *et al.*, 2015). By giving full respect to varied belief systems, *Wasathiyah* upholds Islamic justice while promoting inclusiveness within governance and, therefore, giving room for varied views to be accommodated. This approach goes a long way in countering extremism and radicalism, as it advocates for balance in religious practice and governance. This also minimizes the looming terrorism and violence;

hence, a peaceful coexistence of people without any apprehension about discrimination will be guaranteed, argues Ali Nasith (2024). Similarly, in Singapore and Indonesia, *Wasathiyah* has been adopted as a model by organizations such as MUIs, Muhammadiyah, and Nahdlatul Ulama for promoting interfaith harmony and social cohesion (Muhidin *et al.*, 2021; Niam, 2019).

Wasathiyah, within the educational context, instills character and tolerance. Examples include how the concept of *Wasathiyah* is implemented in pesantren and madrasas and how other educational institutions disseminate the concept of *Wasathiyah*. Students are taught how to develop balanced religious views, mutual respect, and social responsibility (Ghozali, 2024). Similarly, many educational programs have focused on *Wasathiyah* to provide a counter-narrative in regard to cyberterrorism and extremist ideologies that spread over the Internet. It also carries out various deradicalization programs (Mansyur *et al.*, 2023; Ma'arif *et al.*, 2023). Moreover, contemporary Sufi movements, with representatives like Cak Nun, implement principles of *Wasathiyah* in promoting human values, tolerance, and cultural heritage, thus influencing larger societal attitudes (Robingatun *et al.*, 2024).

Despite all its benefits, the practice of *Wasathiyah* is not without challenges. All of the misconceptions and wrong practices associated with this concept take away from its essence, since it is sometimes used for personal gain instead of its foremost purpose of moderation and balance (Bakir & Othman, 2017). Dealing with extremism and radicalism also requires a long-term commitment to make sure that *Wasathiyah* works as a comprehensive counter-narrative to intolerant ideologies (Wilujeng & Risman, 2020). *Wasathiyah* continues to reflect an adaptive as well as a significant strand in developing an enabling peaceful, equal, and inclusive human development process by encouraging interfaith dialog, cultivating inclusiveness, and coming up with remedies pertaining to pressing concerns. The flexibility of *Wasathiyah* through diverse contexts

underlines the potential that modern questions and issues can be taken on board within an Islamic relevance framework (Mubin *et al.*, 2024).

MOOCs in Religious Education

The utilization of MOOCs in religious education has opened new avenues toward making religious studies more accessible and engaging (Mulyana *et al.*, 2024). MOOCs ensure that high-quality religious education is made available to learners globally, thus breaking down some of the geographic and economic barriers that usually make such opportunities unreachable (Nafa *et al.*, 2021). This democratization of education tries to reach the many students who have to stay in countries that are either considered to be developing or who are located even further out for ease of access related to religiously connected resources (Moura *et al.*, 2017). Thus, this gives MOOCs the ability to present paths into education, through religious content, in a manner previously not offered, and to foster inclusivity and equity for incredibly diverse learners.

One of the strong points regarding MOOCs is their flexibility and range of resources. Learners can study independently and according to schedules that allow them to attend to personal responsibilities, whether in the form of work or familial obligations (Schuwer *et al.*, 2015). Such flexibility makes MOOCs more appealing to individuals that find the nature of traditional education too repressive. Additionally, religious education, a subject that relies much on different explanations and texts, appreciates the many learning materials and views that MOOCs present (Mercer, 2018). However, how far MOOCs finally succeed in fostering deep understanding depends upon the effectiveness of their engaging learners, which may not be very satisfying due to limited interaction with instructors and peers (Castellanos-Reyes, 2021). The absence of direct discussions, as in the centerpiece of religious studies, keeps critical discussions away.

Despite their potential, MOOCs in religious education face challenges in content quality, learner support and cultural sensitivity (Mulyana *et al.*, 2024). The design of MOOCs should respect diverse religious beliefs and practices in order to create an inclusive and respectful learning environment (Zhu *et al.*, 2021). If not attended to, these issues have the potential to alienate learners and defeat the effectiveness of such courses. A very good example of successful implementation is Cardiff University's MOOC, 'Muslims in Britain: Changes and Challenges', which, by attracting over 20,899 international learners, showed how MOOCs can be used as an effective way of engaging in substantial discussions on religious issues (Gilliat-Ray, 2020). This case underlines consideration of certain cultural and religious contexts within the curriculum. Further, as an area in religious education that keeps on developing, especially MOOCs, overcoming the challenges mentioned would be an important issue in the perspective of fully using its potential to develop high-quality learning processes for all participants around the globe (Deng *et al.*, 2019).

Religious Moderation in the Digital Era

A smart response to the growth of digital religious moderation is the prevalence of conservative and radical narratives within religious discourses. In using digital channels, moderate religious groups seek balanced and inclusive religious discourses that reduce the impact of the extreme ideologies (Kholili *et al.*, 2024). Websites like Islami.co thus act as an essential force in such filtering processes: they edit out radical discourses and replace them with friendly, accessible content to which middle-class Muslims, frequently exposed to fundamentalist discourses, can easily relate (Zamzami *et al.*, 2023). The websites do an excellent job of facilitating nuanced understanding of religious teachings, which, in turn, inspires the adoption of moderate outlooks befitting modern social realities. To this end, social media magnifies such moves through the dissemination of engaging videos, articles, and messages relevant to

millennials by drawing connections between what has been taught religiously for ages to today's ills (Febriani & Ritonga, 2022).

The most effective measures for encouraging, supporting, and also promoting religious moderation within an educational context are top-down and theoretical rather than practical (Mahpur *et al.*, 2023). While such efforts and programs may have noble intentions in bringing their attempted moderation into school curricula, their surface implementation may fall short of embedding such values and principles into the wider culture of schooling. This might render the students more prone to intolerance and radicalism. This emphasizes that reform is in dire need of a form that caters to experiential learning of the students, allowing a practice of moderate religious values (Radović *et al.*, 2021). Also, the influence of new 'religious digital creatives' does not emerge through conventional training; their use of digital skills has already reconstituted what was previously understood as religious leadership (Campbell, 2020). New voices bring innovation and diversity to the discourse, offering new opportunities to articulate moderation in ways resonating with a digitally savvy audience.

Besides all of the achievements, there are also still several significant challenges to overcome if religious moderation is to be promoted in the digital era. For instance, in this case, it is how the superficiality of moderation is still underexplored or limited to textual learning as it has been practiced in some educational institutions (Nyanasuryanadi *et al.*, 2023). By not having to apply the principles in daily life and practice, such values may not strike roots and could leave space for extremist ideologies to fill. Furthermore, digital platforms have made it necessary to reconsider traditional religious authority and means of reaching out to the young generation (Raya, 2024). This would only be achievable through comprehensive strategies that include educational reforms, de-radicalization programs, and community engagement through innovative approaches and continuous research (Eden *et al.*, 2024). Hence, the need for religious moderation awareness campaigns

remains effective and sustainable amid ever-evolving religious discourses in the new digital world.

Knowledge, Attitudes, and Perception Towards MOOCs

Massive Open Online Courses have been a leading platform for education in the ever-changing digital world, allowing anyone anywhere to have access to knowledge (Knox, 2015). In order to grasp the nature of uptake and efficacy of MOOCs, it is critical to explore the knowledge, attitudes and perceptions that form part of the lay print in this space of asynchronous learning (Baker *et al.*, 2016). Key in this approach is the concept that *Wasathiyah* (moderation) in Islam can be used as a reference framework for the study of the application of this in the case of online education. In that respect, *Wasathiyah* teaches balance and justice; it encourages people to read and to develop good attitudes and constructive perceptions towards various learning mediums such as MOOCs.

Participants should know the concept of MOOCs as an educational resource and its framework and benefits. As previously reported, previous studies have also indicated the factors that gave rise to the success of MOOCs are closely related to the skills of the participants for applying online educational resources, in contrast with their digital literacy levels (Liyanagunawardena *et al.*, 2013). In addition, exposure to moderate Islamic values will also increase the participants' awareness about the value of tolerance and national harmony (Mulasi & Saputra, 2024). Compared to conventional methods, MOOCs have the potential to enhance our understanding of Islamic moderation among participants through structured content centered on moderate values.

Ease of access, quality of materials, and interaction during learning are some of the important participant learning experiences about MOOCs, and they are important factors determining attitudes toward MOOCs. Interaction and relevance are more associated with a positive attitude

towards MOOCs that meet participants' learning needs (Zheng *et al.*, 2015). The design of the content in MOOCs can further drive participants' attitudes toward MOOCs by emphasizing the moderate values of *Wasathiyah*, such as tolerance, justice, and balance. They can also improve the participants' perceptions of MOOC (Abhishek *et al.*, 2023; Ferrari *et al.*, 2024). In that sense, they are positive in participating more in the discussion as well as reflections to further reinforce the understanding of Islamic moderation.

Furthermore, learners' perceptions of MOOCs are also associated with trust in a MOOC platform (i.e., the credibility and benefit), the quality of the material, and benefits gained (Costello *et al.*, 2018). Strengthening of positive perceptions about MOOCs is found to result from engaging course design, interactive features, and the delivery of culturally relevant content (Hew & Cheung 2014). Because learners' perceptions of MOOCs are contextual with respect to *Wasathiyah*, they are important since they indicate how learners perceive the Islamic values of moderation taught through the platform (Mulyana *et al.*, 2024). Such perceptions could enable us to extend the domain of the acceptance of values of moderation to various groups in society. Thus, the interrelationship between knowledge, attitude, and perception towards MOOCs and overall effectiveness in conveying *Wasathiyah* values is paramount. In this sense, MOOCs can be used as powerful drivers to inculcate more knowledge and foster positive attitudes and perceptions (Alyoussef, 2023; Dagenais *et al.*, 2024) toward the platform to entail Islamic moderation at the global level.

Method

This chapter focuses on the methods that are used to seek answers to research questions and research hypotheses. The description starts with the research paradigm, research design, research participant, the process of collecting data, the instrument for measuring the level of the students' understanding, and data analysis. Through systematic

explanation, this section deals with the entire process and thus presents the research project in a comprehensive manner, ensuring the research norms and ethics.

Research Paradigm and Research Design

This research adopts a positivist paradigm, prioritizing a quantitative approach to analyze the influence of MOOCs on students' comprehension of *Wasathiyah Islam* and religious moderation. Creswell (2012) described positivism as emphasizing that knowledge is based on what is empirically observed and accessible to the senses. To achieve this, a quasi-experimental research design was adopted, administering surveys to participants in the form of a pretest before starting the learning activities and a post-test after their completion of the *Islam Wasathiyah* course at MOOC to collect primary quantitative data. The absence of a control group in this research limits the capacity to draw strong correlations, as the improvements might be influenced by some external factors such as initial knowledge and media exposure. Afterwards, the data were analyzed statistically to assess the effectiveness of the MOOC on the knowledge and attitude of the participants, comparing the scores of the pretests and post-tests, following Cohen *et al.* (2017). Such a design assures the validity of the findings and contributes to more extensive discussions on how digital learning may foster peaceful and respectful coexistence among people of different religious communities.

Course Design

The MOOC, '*Islam Wasathiyah*,' was delivered on the UdeMy platform and designed in a modular structure, allowing students to move ahead at their own pace. The course was designed to be completed within four weeks, with one module covered per week. However, the actual completion time might vary depending on the learners' individual pace.

Each module consists of eight to ten video lessons, with each video ranging from three to ten minutes in duration. The four distinct course modules include 1) Introduction to *Wasathiyah* Islam, 2) *Wasathiyah* in Education, 3) *Wasathiyah* in Politics and Government, and 4) *Wasathiyah* in Social, Economic, and Cultural Life. These four modules were delivered by different lecturers who are experts in *Wasathiyah Islam* and other fields that are related to applying this knowledge in daily life, such as education, politics, and social economics.

One of the enduring challenges in MOOC implementation is sustaining learner motivation and completion rates. Lee *et al.* (2018) found that high dropout rates are often linked to uneven levels of self-regulated learning among participants. To overcome this, Lee *et al.* (2018) proposed a self-directed and sequential course design that encourages learners to take ownership of their learning process, such as by monitoring progress, revisiting materials, and pacing study according to personal needs and time constraints. By compartmentalizing the complex problem of religious moderation into thematic groups, the developed course enabled sequential and systematic understanding and mastery of essential concepts before proceeding to more sophisticated applications. The *Islam Wasathiyah* course curriculum was a consciously mixed array of learning activities such as video lessons, discussion, assignment, and reflective tasks, calibrated to appeal to varied learning styles and access more in-depth understanding of the material.

To foster active learning and enhance understanding of *Wasathiyah*, the course integrated several key pedagogical features. Formative and summative assessment, through lesson and module terminal quizzes, was employed to reinforce learning and provide immediate feedback on understanding (Wang *et al.*, 2022). Beyond mere knowledge acquisition, reflective practice was also emphasized in the course design. Activities, such as 'Reflection 1: *Nilai Islam Wasathiyah dalam Hidup Saya*' and 'Reflection 2: *Islam Wasathiyah - Belajar dan Berubah*,' as examples from other students who already finished the

course, were included specifically to enable participants to make theoretical *Wasathiyah* concepts applicable to their own beliefs, behaviors, and experiences. Apart from that, the course also made use of the platform's discussion forums in order to create a community-based learning atmosphere. While the user provides a list of lesson topic titles, the titles suggest potential for peer-to-peer engagement whereby learners can engage in debate and discussion of complex issues, fostering a forum for communication and tolerance building that is at the heart of religious moderation. These blends of self-study, continuous assessment, reflective tasks, and collaborative components are intended to move participants from passive reception of religious moderation knowledge to active, critical, practical knowledge of religious moderation.

Research Participant

A total of 32 participants who had completed the *Islam Wasathiyah* MOOC were involved in this study. According to Jordan (2014), only about 6.5 percent of MOOC enrollees typically complete their courses, which suggests that the number of participants in this study is relatively strong in the context of online learning completion rates. Participants were selected based on course completion status to ensure adequate exposure to the content. The participants represented diverse demographic backgrounds, including variations in gender, age, educational level and professional status. While all participants identified as Muslims, their academic and occupational diversity ranging from university students and educators to professionals offered rich perspectives on how the course influenced their understanding of *Wasathiyah* values. This diversity enhanced the validity of the findings by reducing potential bias related to religious homogeneity.

The open and accessible nature of the MOOCs had no restrictions on learners from different regions and educational disciplines, as noted by Littlejohn *et al.* in 2016. According to Field (2018), such diversity brings a

wide spectrum of experiences and insights, which, in this instance, helped in understanding how this online learning has shaped perceptions about moderation within Islam. Table 1 summarizes the demographic details of participants and a spectrum of perspectives that enriched this research, reinforcing the relevance of its conclusions.

Table 1: Demographic Data

Characteristic	Description	Frequency	Percentage
Age	< 18 years	2	6.25%
	18-25 years	22	68.75%
	26-35 years	7	21.875%
	36-45 years	1	3.125%
	> 45 years	-	-
Gender	Male	12	37.50%
	Female	20	62.50%
Religion	Islam	32	100%
Education Level	Secondary School	3	9.375%
	Diploma	-	-
	Undergraduate	22	68.75%
	Master	4	12.50%
	Doctoral	3	9.375%
Field of Education	Religious Studies	5	15.625%
	Education	18	56.25%
	Social & Humanities	3	9.375%
	STEM	3	9.375%
	Others	3	9.375%

Data Collection and Research Instruments

Research had been conducted in an organized manner, allowing the findings of the research concerning the impact made by MOOCs on students with regard to understanding *Wasathiyah Islam* to be appropriate and valid (Mandasini, 2022). Different participants were recruited with the help of social media platforms, educational forums, and groups within the community to spread word about the course. The purpose and process of the research and ethical considerations were explained to the participants in two stages, both pretest and post-test, using a structured questionnaire. Participants needed to fill in the informed consent voluntarily before judging the given statement. Moreover, data obtained from the survey were anonymized before being used in the analysis process. The survey contained a Likert scale on opinions or the level of knowledge of participants regarding aspects of *Wasathiyah* that encourage moderation in religious practices according to Islamic teachings (Joshi *et al.*, 2015). Besides, there were demographic questions regarding the background diversity of students that might affect learning outcomes (Bryman, 2016). Pilot data was collected in this first phase to further develop the clarity and effectiveness of survey tools while making initial insights into the design of the study. These materials and other supportive resources facilitate data collection processes.

The instruments also displayed a strong degree of unidimensionality, with the raw variance index (Appendix 3) far exceeding the threshold 40 percent level recommended for confirmatory purposes that show the tool has adequate ability to measure constructs (Fisher, 2007). Additionally, the rating scale analysis showed validity based on the Andrich Threshold table (see Appendix 4) (Van Zile-Tamsen, 2017), where the values progressed logically from none to negative and then increasingly positive. This indicates that the five-point Likert scale, ranging from strongly disagree to strongly agree, was appropriate and easily understood by respondents (Sumintono & Widhiarso, 2014). The intensive development process, informed by feedback from the pilot

study, made the questionnaires relevant to the subject, comprehensive, and capable of yielding robust data in analyzing the potential of digital learning in promoting religious moderation (Field, 2018).

Data Analysis

The quantitative approach was adopted in the data analysis to identify the impact of the MOOC on the respondents' level of understanding regarding *Wasathiyah Islam* before and after attending the course. Data collected from both the pretest and post-test surveys were compiled into the IBM SPSS Statistics application for complete analysis (Field, 2018). The demographic data of participants, including age, gender and educational background (see Table 1), was summarized using descriptive statistics to contextualize students' perception of *Wasathiyah Islam*. This stage has given students a contextual understanding of *Wasathiyah Islam* and identified any biases or trends that might be arising. The Wilcoxon signed-rank test would provide a nonparametric counterpart to the paired-sample t-test in the assessment of change in comprehension scores pretest and post-test, which, according to Creswell (2012), would fail to meet the classical assumptions for such data. In turn, this would help the researchers examine if there has taken place any significant change in students' comprehension with regard to the distributional properties of data.

Beyond descriptive and inferential statistical analysis, the Rasch Model has been employed to explore an accurate estimation of individual ability in the pretest and post-test, using logit scales for evaluating item difficulty and participant performance. This gives a more comprehensive explanation of the results of the intervention, as by Bond and Fox (2015). Besides, the Rasch model also provides the distribution of students' understanding about *Wasathiyah Islam*, enabling researchers to look at the level of understanding, which reflects diverse backgrounds (Boone *et al.*, 2014). These statistical approaches allowed the researchers to indicate

the enhanced participants' understanding of *Wasathiyah Islam* through MOOCs. These interpretations of results can answer the research questions and provide some valuable insights into how MOOCs can effectively foster *Wasathiyah Islam* and help its diverse audience to practice religious moderation.

Findings

Mean Logit Comparison

The summary of statistics for the pretest is illustrated in Table 2, and the post-test in Table 3. This analysis shows the average change regarding participants' ability estimates from pretest to post-test. In the pretest, the mean logit of person or participant is shown as 0.63 with a standard deviation of 3.70. The mean logit of person shows the average ability of the test-takers, while the SD result shows a variability in ability of the test-takers (Boone *et al.*, 2014). This indicates participants' distinct and varied level of understanding of *Wasathiyah Islam* before taking the course. Meanwhile, the mean logit of the item shows 0.00 with a standard deviation of 0.50, indicating the middle difficulty of the items is located precisely at 0 logit, and the SD value indicates the variation in the item difficulty level (Bond & Fox, 2015). Thus, from the pretest result, it can be summarized that the test was dependable for measuring participants' varied understanding of the concept of *Wasathiyah Islam* at the early stage of the study.

Table 2: Summary Statistics Pretest

	Mean Logit (SD)	Separation	Reliability	Alpha Cronbach
<i>Person</i>	0.63 (3.70)	4.29	0.95	0.97
<i>Item</i>	0.00 (0.50)	0.85	0.42	

For the post-test, as illustrated in Table 3, the mean logit of participants' ability (understanding) is 4.45. When compared to the pretest results, there is a significant increase in the average level of participants' ability. This indicates that the understanding of the *Wasathiyah Islam* concept is improving after participants take the online course. Additionally, the variability of participants' ability remains high (SD=3.59). Meanwhile, for the item level, compared to the pretest, the average level of item difficulty remains at 0 logit, and the variability of item difficulty is slightly increased to 0.73. Thus, in the post-test, it can be concluded that there is significant knowledge improvement after participants enroll in the course.

Table 3: Summary Statistics post-test

	Mean Logit (SD)	Separation	Reliability	Alpha Cronbach
<i>Person</i>	4.45 (3.59)	2.84	0.89	0.96
<i>Item</i>	0.00 (0.73)	1	0.5	

Separation and reliability analysis

Separation and reliability results show the test's ability to discriminate participants' understanding both in the pretest and post-test. Table 2 illustrates the separation index of the pretest. According to the results, the separation value of participants' abilities (4.29) suggest good discrimination between high and low performers. This reflects the varied knowledge of the *Wasathiyah Islam* concept among participants in the pretest. Similarly, the item separation shows how well the instrument can measure participants from diverse understanding levels. The value of 0.85 indicates a limited item diversity; meaning, the test does not have enough

variety of items to measure participants at a certain ability level (see Appendix 2).

In addition, the value of person reliability index of 0.95 suggests that the test can reliably measure the participants' abilities with minimal error in the measurement. While on the other hand, item reliability of 0.42 suggests poor reliability in terms of the discrimination of item difficulty. Also, the Cronbach alpha coefficient value of 0.97 suggests very good in terms of measuring the internal consistency between participants and test items. This high value indicates that the instrument is reliable and highly consistent when measuring the construct. Thus, the results of the pretest highlight that the test was effective in distinguishing between participants who understand the concept of *Wasathiyah Islam* and those who did not.

Furthermore, the separation indices of person and item for the post-test are 2.84 and 1.00, respectively. The results of person separation in the post-test shows a decrease in comparison to the pretest. This decrease indicates a reduction in the variation of participants' ability after course enrollment; meaning, more participants have a better understanding of the concept of *Wasathiyah Islam* after they take the course. On the other hand, item discrimination has also improved but remains moderate. For person and item reliability, they are 0.89 and 0.50, respectively, showing a slight decrease for person reliability and an increase for item reliability. In addition, the Cronbach alpha coefficient value remains high (0.96), reflecting the internal consistency in the post-test.

Eventually, the decreased value in person separation and reliability in the post-test is the result of clustering abilities, as can be seen in the higher end of the variable map (see Appendix 2). The clustering abilities located at the higher end of the map indicate improvement in the concept understanding after the course enrollment. Overall, the results of higher person separation in the pretest reflect a diverse knowledge among participants. Thus, the decreased value in post-tests is evidence that

participants converged towards a better understanding of *Wasathiyah Islam*. In addition, the results of item separation and reliability suggest refinement for better test design in the future.

Participants' Ability Analysis

The analysis with the Rasch model produces a statistical analysis of fit (fit statistics), which provides information that describes how a person with a high ability is likely to respond to items according to their level of difficulty (Azizah *et al.*, 2022). The parameters used are Infit and Outfit from the mean square and standardized values. Items that match (fit) mean that the question behaves consistently with what is expected by the model. Some of the fit indices provided in the Rasch analysis are Person Infit ZSTD, Person Outfit ZSTD, Person Infit MNSQ, and Person Outfit MNSQ.

This section discusses the results of participants' ability analysis seen from two output tables from Winstep software: the misfit response and the unexpected response. The summary of participants' misfit response is shown in Table 4. According to Boone *et al.* (2014), the value of outfit mean-square (MNSQ), outfit z-standard (ZSTD), and point measure correlation (PTMEA) are used to see the fit of the participants' response patterns. The criteria of the acceptable range of each of these values are $0.5 < \text{MNSQ} < 1.5$ for outfit mean square, $-2.0 < \text{ZSTD} < +2.0$ for z-standard, and $0.4 < \text{Pt Mean Corr} < 0.85$ for the point measure correlation value.

The outfit MNSQ value explains how much noise or unexpected response emerged, seen from participants' responses towards items that have a difficulty level that is very easy or very hard (Bond & Fox, 2015). From the results, there are three participants identified as having a value outside of the acceptable range (see Table 4). For instance, participant number 10 MNSQ's value (1.81) exceeds the acceptable range, meaning

the answer contains more unexpected variation than what is predicted by the model. This is likely due to random answering, guessing, or other anomalies (Azizah *et al.*, 2021). Furthermore, the values of participants number 3 and 14 (0.10) show a value below the expected range, which indicates an overfit. The overfit means that the responses from these participants are more predictable than expected.

Table 4: *Person misfit order*

Participant number	Outfit MNSQ	Outfit ZSTD	PT-Measure Correlation
10	1.81	2.2	0.26
3	0.10	-2.5	0.00
14	0.10	-2.5	0.00

For the outfit ZSTD value, it reflects the sample size and variability and how significant the deviation is from the expected model (Bond & Fox, 2015). From the results, the value above +2 in participant number 10 (2.2) indicates a statistically significant misfit. This tells us that the participant's response is inconsistent or unusual. Moreover, the value below -2 in participants number 3 and 14 (-2.5) indicates an overfit; meaning, the responses are too predictable, which might suggest that participants have limited variability in their answers, like always choosing similar options.

Point measure correlation value reflects the patterns of participants' responses, how well they align with the expected difficulty levels of the items, and their ability. According to the results, a positive but relatively low correlation in participant number 10 (0.26) suggests an alignment between the participant's response and the model, but not a very strong one. Also, the value of 0.00 from participants number 3 and 14

indicates no meaningful alignment between their responses and the expected model. This might suggest that they responded to the items randomly. Overall, the identification of participants who meet all three misfit parameters underscores the importance of quality control to ensure rigorous measurements.

Also, results of the Guttman scalogram (see Appendix 6) add to the clarity about the patterns of participant responses, which support the evaluation of misfit statistics. For instance, the answers pattern of participant number 10 shows a variation of higher (5) and lower (3/4) scores. This variation suggests varying levels of engagement or understanding of the test items, reflecting a partial grasp of the material or external factors that affect participants' focus. On the other hand, responses from participants numbers 3 and 14 show all moderate scores (3), which indicates a probability of either the participants being less engaged with the course material or reliance on a fixed response strategy in filling out the questionnaire.

Table 5: *Descriptive Statistic*

	N	Min	Max	Mean	Std. Deviation	Variance
<i>Pretest</i>	32	10	50	31.81	9.406	88.480
<i>post-test</i>	32	30	50	43.03	6.109	37.322

Results from SPSS descriptive statistics are illustrated in Table 5. The N label explains the number of participants in the analysis with valid data. It shows 32 in both the pre- and post-tests, which is the same as the number of participants in this study. Furthermore, the mean value of the post-test (43.03) is higher than the pretest (31.81), which indicates an improvement in participants' knowledge after the course enrollment

(MOOC). In addition, the standard deviation and variance values are lower in the post-test compared to the pretest. This suggests that participants' scores are becoming more consistent after they join the course.

Table 6: *Ranks Result Pretest - Post-test*

	N	Mean Rank	Sum of Ranks
Negative Ranks	1 ^a	1.50	1.50
Positive Ranks	28 ^b	15.48	433.50
Ties	3 ^c		
Total	32		

^a *post-test score < pretest score*

^b *post-test score > pretest score*

^c *post-test score = pretest score*

The Ranks table (see Table 6) shows the comparison for individual participants between pretest and post-test scores (Muijs, 2004). Negative ranks (1a) explain that only one participant has a lower score in the post-test than in the pretest. For the positive ranks (28b), it suggests that there are 28 participants who scored higher in the post-test than in the pretest. Also, the ties (3c) mean there are three participants who had no change in scores or had the same scores in the pretest and post-test. Thus, it can be concluded that from 32 participants, 28 of them improved after the course's enrollment. This large number of positive ranks implies that the MOOC effectively increases participants' knowledge about *Wasathiyah Islam*.

Table 7: Wilcoxon Signed Rank Test

	Pretest-post-test
Z	-4.657
Asymp. Sig. (2-tailed)	<0.001

Based on the Wilcoxon Signed Rank Test table (see Table 7), the Z value is -4.675 and the p value is < 0.001 . The p -value is lower than 0.05, which indicates that the result is highly statistically significant (Muijs, 2004). Overall, these results confirm that there has been a statistically significant and measurable impact on participants' understanding of *Wasathiyah Islam* after going through the MOOC. From the Rasch analysis, clear improvements in participant ability estimates showed high reliability with internal consistency of the test instrument. The clustering of the abilities in the post-test indicates the success of the MOOC in establishing shared understanding among the participants. Additionally, the Wilcoxon Signed Rank Test confirms that the observed improvement is statistically significant ($p < 0.001$). Therefore, the findings constitute evidence of MOOC effectiveness. The results thus tend to indicate that MOOCs represent a suitable vehicle for knowledge enrichment in advancing religious moderation, tolerance and cooperation within multi-religious, multicultural societies.

Discussion

This study proposed that the participation of the respondents in the Islam *Wasathiyah* MOOC would significantly increase knowledge about *Wasathiyah Islam* and religious moderation. The data confirmed this proposition, as can be seen from significant improvements in the understanding of participants, which has been validated through both Rasch analysis and the Wilcoxon Signed Rank Test. The results showed a

significantly high increase in participants' understanding of *Wasathiyah Islam*, from pretest logit 0.63 to 4.45 post-test ($Z = -4.675$, $p < 0.001$). This kind of high improvement never occurred coincidentally but was a reflection of how well the MOOC was designed as a course and of the focus on active pedagogy. For instance, modules that break down complex topics such as '*Wasathiyah in Politics*' into manageable lessons, with continuous formative quizzes, allow the learners to understand each concept before going ahead. Furthermore, reflective exercises inserted into each module, such as '*Reflection: Islam Wasathiyah untuk Dunia yang Damai*,' encourage attendees to not only absorb information but also internalize the essence of moderation and put that into practice within their living environments.

Such a rise in knowledge underlines the transformative potential of MOOCs as digital learning platforms for addressing societal challenges like extremism and intolerance. This finding is in line with the increasing awareness of online education as a scalable and accessible solution for developing critical socio-religious values in multicultural and multireligious societies. This is also in line with research in the literature, which shows that learning involves reflection, and personal context leads to higher levels of understanding and more consistent attitude change. Denton (2009) also assumed that reflection can make students experience a deeper level of knowing, rather than memorizing facts, and can push them to think on a higher level.

The findings agree with previous work done on the efficacy of MOOCs in engendering diverse and effective learning environments (Mulyana *et al.*, 2024). Unlike traditional classrooms that are often restricted by socio-demographic factors, MOOCs unite learners from across the world; interactions are extended beyond ideological and geographical boundaries (Zhu *et al.*, 2021). The *Islam Wasathiyah* MOOC uses such diversity to let participants exchange their ideas and come to a better understanding of religious moderation. Such interactions are very important in expanding learners' perspectives and fostering tolerance,

therefore underscoring the role of MOOCs in facilitating inclusive education and fostering dialogue across differences.

This work also contributes to the continuing debate on the influence of technology on learning and social interaction. While digital platforms, like social media, are often criticized for fostering echo chambers and limiting exposure to diverse viewpoints (Kim, 2023), this research illustrates how MOOCs can be tools for promoting tolerance and understanding. MOOCs facilitate a structured collaborative learning environment in which the participants engage in different perspectives of diverse backgrounds that generally have been found polarizing in other platforms. That, therefore, emphasizes how important intentional design leveraging technology is to serve positive educational and social outcomes (Gilliat-Ray, 2020).

However, it must be noted here that such outcomes are to be addressed from a more critical perspective. While the average outcome shows clear development, its large standard deviation (S.D. = 3.59) at post-test means that participants exhibit extreme variability in their degree of understanding. This uneven impact may reflect differences in learners' prior knowledge, engagement levels, and learning contexts. Moreover, several cases showed misfit statistics (see Appendix 5), which could be attributed to inconsistent response patterns or varying interpretations of certain items. This discrepancy can be explained by many reasons, such as different levels of digital literacy, disparate internet access, or the lack of face-to-face interaction with the facilitator, possibly a hindrance for some students.

Moreover, the small number of students who finish the course implies there are students who do not finish the course from the beginning until the end. Hew and Cheung (2014) stated that high dropout rates in MOOCs are often due to lack of incentives, inability to understand the material, and absence of direct support from the instructor. The limitation of face-to-face interaction, one of the inherent characteristics of MOOCs,

could be a handicap to intricate and nuanced discussion, very important in delicate matters such as religion. Hence, even if MOOCs are proven to be effective as a means of disseminating knowledge on *Wasathiyah*, such websites would have to be complemented by support services such as webinar sessions or mediated discussion forums so that knowledge gaps can be bridged and all the stakeholders, regardless of their background or technical challenges, can gain a holistic understanding.

Above all, this study has a novelty that leads to investigating the contribution of MOOCs regarding religious moderation, an issue considered a prime discussion point within modern society's polarization dynamics (Kamal, 2022). In an Islamic sense, the idea of *Wasathiyah* enforces principles like balance, tolerance and peaceful coexistence; thus, much is at stake besides mere knowledge in encouraging these attitudinal predispositions in promoting a lifestyle of harmonious coexistence (Kamali, 2015). The improved understanding of the participants is all explained by the MOOCs' content delivery structure and the interactive features that offer participants clear explanations and contextual samples of *Wasathiyah Islam* (Hew & Cheung, 2014). Alternatively, the collaborative learning environment is where people took the part of peers and pursued peer instruction and reflection (Zhu *et al.*, 2020).

The *Islam Wasathiyah* MOOC thus reflects how education could act as a transformative tool in the development of social harmony, integrating these values into an electronic learning environment. Policy makers and educators may further consider the role that MOOCs might play in addressing complex social problems, being mutually respectful, being cooperative, or gaining an inclusive understanding of religious moderation in diversified communities. This initiative could be addressed by integrating *Wasathiyah*-based modules into national e-learning platforms, accompanied by instructor training and content moderation. Such an approach may also help address Indonesia's national challenges related to the digital divide. These findings confirm the role of MOOCs in addressing critical global issues, thus opening wider perspectives for their

application in education and peacebuilding processes. Lastly, other course designs could be studied in the future, which could disentangle these learning mechanisms.

Conclusion

Results of this study provide empirical evidence that online learning platforms, such as MOOCs, can tackle some pressing challenges facing contemporary societies, namely, those of counteracting violent extremism and promoting tolerance within multicultural, multi-religious societies. The study fills an important gap in the literature on how MOOCs could contribute to knowledge about *Wasathiyah Islam* in a structured and scalable manner; after all, discussions about MOOCs very often revolve around applications for technical or professional subjects, rather than the potential to shape socio-religious attitudes. Results underline the transformative potential of digital platforms in promoting understanding and dialog; therefore, they represent a powerful tool through which religious moderation can act in support of peacebuilding. The present research proves that MOOCs' inclusion into the curriculum can be one promising approach to the religious and cultural tensions existing in most regions of the world, being an accessible and efficient method for the creation of tolerance and cooperation.

Additionally, with the MOOC being online and open, individual motivation to take up the questionnaires was a major determinant of whether they would fill them out. That was evident from the analysis, which had some inconsistent responses that did not reflect the participants' actual abilities. Furthermore, the sample size is relatively small; therefore, it may not generalize the findings to the larger population. Some of the test items functioned poorly to represent participants' knowledge and thus indicate a need for the improvement of the test for better validity and fairness. Future research should be done in refining the test in terms of a wider range of difficulty and effectiveness. Moreover, relying on self-

report data and focusing on cognitive understanding, without observing behavioral change, are notable limitations, as is lacking a long-term follow-up to assess knowledge retention. This suggests that future research should explore the sustained effects of online learning on learners' understanding of materials, confirming its uniform influence across all learners. Overall, this study shows that MOOCs could act as strong tools in the promotion of religious moderation. Helping the participants understand a deeper meaning of *Wasathiyah Islam*, MOOCs can encourage tolerance and cooperation in plural societies. This research shows the importance of using digital platforms to solve critical social and religious challenges and opens new possibilities for further exploration.

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Appendixes

Appendix 1. Summary Statistics Pretest and post-test

Pretest:

SUMMARY OF 32 MEASURED (EXTREME AND NON-EXTREME) Person									
	TOTAL		MODEL			INFIT		OUTFIT	
	SCORE	COUNT	MEASURE	ERROR	MNSQ	ZSTD	MNSQ	ZSTD	
MEAN	31.8	10.0	.63	.71					
S.D.	9.3	.0	3.70	.31					
MAX.	50.0	10.0	9.15	1.86					
MIN.	10.0	10.0	-8.77	.57	.05	-3.3	.05	-3.3	

REAL RMSE	.84	TRUE SD	3.61	SEPARATION	4.29	Person RELIABILITY	.95		
MODEL RMSE	.77	TRUE SD	3.62	SEPARATION	4.70	Person RELIABILITY	.96		
S.E. OF Person MEAN = .67									

Person RAW SCORE-TO-MEASURE CORRELATION = 1.00									
CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY = .97									
SUMMARY OF 10 MEASURED (NON-EXTREME) Item									
	TOTAL		MODEL			INFIT		OUTFIT	
	SCORE	COUNT	MEASURE	ERROR	MNSQ	ZSTD	MNSQ	ZSTD	
MEAN	101.8	32.0	.00	.36	.99	.0	.96	-.1	
S.D.	3.9	.0	.50	.32	1.1	.30	1.0		
MAX.	110.0	32.0	.61	.36	1.59	1.9	1.57	1.8	
MIN.	97.0	32.0	-1.04	.35	.63	-1.5	.62	-1.3	

REAL RMSE	.38	TRUE SD	.32	SEPARATION	.85	Item RELIABILITY	.42		
MODEL RMSE	.36	TRUE SD	.35	SEPARATION	.98	Item RELIABILITY	.49		
S.E. OF Item MEAN = .17									

post-test:

SUMMARY OF 32 MEASURED (EXTREME AND NON-EXTREME) Person

	TOTAL		MODEL			INFIT		OUTFIT	
	SCORE	COUNT	MEASURE	ERROR	MNSQ	ZSTD	MNSQ	ZSTD	
MEAN	43.0	10.0	4.45	1.04					
S.D.	6.0	.0	3.59	.48					
MAX.	50.0	10.0	9.00	1.86					
MIN.	30.0	10.0	-2.68	.64	.07	-2.5	.05	-2.5	

REAL RMSE 1.19 TRUE SD 3.38 SEPARATION 2.84 Person RELIABILITY .89 |
 MODEL RMSE 1.15 TRUE SD 3.40 SEPARATION 2.96 Person RELIABILITY .90 |
 S.E. OF Person MEAN = .64

Person RAW SCORE-TO-MEASURE CORRELATION = .99
 CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY = .96

SUMMARY OF 10 MEASURED (NON-EXTREME) Item

	TOTAL		MODEL			INFIT		OUTFIT	
	SCORE	COUNT	MEASURE	ERROR	MNSQ	ZSTD	MNSQ	ZSTD	
MEAN	137.7	32.0	.00	.49	.98	-.1	.91	-.2	
S.D.	3.1	.0	.73	.33	1.2	.34	1.0		
MAX.	145.0	32.0	.88	.50	1.44	1.3	1.36	1.0	
MIN.	134.0	32.0	-1.76	.48	.43	-2.2	.34	-2.2	

REAL RMSE .52 TRUE SD .52 SEPARATION 1.00 Item RELIABILITY .50 |
 MODEL RMSE .49 TRUE SD .55 SEPARATION 1.12 Item RELIABILITY .56 |
 S.E. OF Item MEAN = .24

Appendix 4. Rating scale analysis

SUMMARY OF CATEGORY STRUCTURE. Model="R"

CATEGORY LABEL	OBSERVED SCORE	OBSVD COUNT	SAMPLE %	AVRGE EXPECT	INFIT MNSQ	OUTFIT MNSQ	ANDRICH THRESHOLD	CATEGORY MEASURE
1	1	16	5	-3.08 -3.25	1.14	1.13	NONE	(-6.30) 1
2	2	67	21	-2.24 -2.17	.90	.87	-5.17	-3.56 2
3	3	120	38	-.43 -.47	.95	.95	-1.94	-.19 3
4	4	77	24	3.07 3.05	.94	.91	1.55	3.56 4
5	5	40	13	6.11 6.16	1.25	1.13	5.57	(6.68) 5

CATEGORY PROBABILITIES: MODES - Structure measures at intersections

```

P      -+-----+-----+-----+-----+-----+-----+-----+
R 1.0 +                                     +
O |
B |
A |11
B .8 + 1
I | 1
L | 1
I | 1 2 2
T .6 + 1 2
Y | 1 2
O | .5 + *
F .4 + 2 1
R | 2 1
E | 2
S .2 + 2
P |22
O |
N |
S .0 +*****+
E -+-----+-----+-----+-----+-----+-----+-----+
    -7      -5      -3      -1      1      3      5      7
    Person [MINUS] Item MEASURE
    
```

Appendix 5. Person Fit

Person STATISTICS: MISFIT ORDER

ENTRY	TOTAL	TOTAL	MODEL		INFIT		OUTFIT		PT-MEASURE		EXACT	MATCH	
NUMBER	SCORE	COUNT	MEASURE	S.E.	MNSQ	ZSTD	MNSQ	ZSTD	CORR.	EXP.	OBS%	EXP%	Person
5	39	10	1.60	.84	2.99	2.2	3.19	2.2	A .59	.24	50.0	84.2	F0
18	31	10	-2.18	.71	2.83	2.4	2.90	2.4	B .56	.33	40.0	76.7	M3
10	44	10	4.91	.67	1.86	2.6	1.81	2.2	C .26	.33	40.0	65.9	F2
29	47	10	6.28	.71	1.84	2.4	1.54	1.2	D .36	.26	80.0	69.9	M4
20	43	10	4.44	.71	1.09	.4	1.28	.8	E .07	.34	80.0	72.8	M2
28	35	10	-.41	.64	.99	.1	1.19	.6	F .16	.32	70.0	61.2	M2
15	48	10	6.85	.81	1.15	.5	1.10	.4	G .04	.22	80.0	79.9	F2
30	46	10	5.80	.67	1.14	.7	1.07	.3	H .12	.30	50.0	64.8	F2
13	43	10	4.44	.71	1.00	.1	1.12	.4	I .21	.34	80.0	72.8	F2
6	42	10	3.89	.78	1.04	.3	.94	.1	J .13	.33	70.0	79.1	F2
2	44	10	4.91	.67	1.01	.1	1.01	.1	K .28	.33	60.0	65.9	M2
22	47	10	6.28	.71	.96	.0	.98	.1	L .29	.26	70.0	69.9	F2
17	48	10	6.85	.81	.96	.1	.88	.0	I .28	.22	80.0	79.9	F2
11	41	10	3.21	.87	.69	-.3	.55	-.4	k .25	.30	90.0	84.6	M0
12	36	10	.01	.65	.67	-1.2	.63	-1.0	j .65	.31	90.0	64.2	F2
25	43	10	4.44	.71	.66	-.9	.60	-1.0	i .70	.34	80.0	72.8	M0
7	39	10	1.60	.84	.52	-.6	.40	-.9	h .40	.24	90.0	84.2	F2
23	41	10	3.21	.87	.31	-1.2	.19	-1.4	g .80	.30	90.0	84.6	M2
3	30	10	-2.68	.71	.11	-2.5	.10	-2.5	f .00	.32	100.0	77.9	F2
14	30	10	-2.68	.71	.11	-2.5	.10	-2.5	e .00	.32	100.0	77.9	F3
1	40	10	2.39	.92	.07	-1.9	.05	-1.9	d .00	.25	100.0	87.5	F2
8	40	10	2.39	.92	.07	-1.9	.05	-1.9	c .00	.25	100.0	87.5	F2
21	40	10	2.39	.92	.07	-1.9	.05	-1.9	b .00	.25	100.0	87.5	F2
24	40	10	2.39	.92	.07	-1.9	.05	-1.9	a .00	.25	100.0	87.5	F2
MEAN	43.0	10.0	4.45	1.04	.93	-.2	.91	-.3		78.8	76.6		
S.D.	6.0	.0	3.59	.48	.78	1.5	.82	1.4		18.8	8.3		

Appendix 6. Guttman Scalogram

GUTTMAN SCALOGRAM OF RESPONSES:

```
Person | Item
      | 1
      |2713684950
      |-----
      |
4 +555555555 F4
9 +555555555 M2
16 +555555555 F2
19 +555555555 F1
26 +555555555 M3
27 +555555555 M4
31 +555555555 M2
32 +555555555 M3
15 +555455455 F2
17 +555455554 F2
22 +545555545 F2
29 +555554553 M4
30 +554544545 F2
2 +545544444 M2
10 +545455345 F2
13 +544444544 F2
20 +544444454 M2
25 +555444444 M0
6 +454444544 F2
11 +454444444 M0
23 +544444444 M2
1 +444444444 F2
8 +444444444 F2
21 +444444444 F2
24 +444444444 F2
5 +535444433 F0
7 +444444443 F2
12 +443444333 F2
28 +343444333 M2
18 +442434233 M3
3 +333333333 F2
14 +333333333 F3
      |-----
      | 1
      |2713684950
```