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MNEMONICS AND THE LEVEL OF RELIGIOUS KNOWLEDGE. THE ANALYSIS OF EMPIRICAL RESEARCH CONCERNING HIGH SCHOOL YOUTH*

Introduction: Efficient memorizing strategies play a key role in the learning process. As a form of extensive memorization, the mnemonics offer a well-structured approach to the improvement of information processing as well as its later reproduction. This research analyzes the use of the Link Mnemonic System in religious education, comparing its efficiency with traditional methods of memorization. Through the study of the effect the mnemonic strategies have on knowledge assimilation of the students of secondary schools, this article provides valuable information regarding the innovative teaching methods, that can support deeper learning and better memorization.
Research Aim: The aim of the presented research was a verification of the efficiency Link Mnemonic System implemented in the transfer of religious knowledge, compared to the traditional forms of memorizing knowledge.
Research Method: A method of quasi-experiment was used for conducting the research; it means the phenomenon was studied in its natural (school) environment. To verify the level of religious knowledge of the second-year students after using the classic and innovative methods of teaching, statistical analyses were conducted and a model of the influence of the variable was created. The variables in question were the *Teaching method* (traditional and innovative) and *Questions concerning the religious knowledge* of the second-year students in relation to the results of the variable called *Number of correct answers* in the multiple-choice test after teaching.
Results: There are diametric differences in the level of religious knowledge among the students who memorized the lesson using the innovative method compared to students who studied using a traditional memorization strategy. The difference between the Link Mnemonic System and traditional memorizing was statistically significant: $p < 0.001$.
Conclusion: Through their creative usage of action and emotion the mnemonic techniques allow for a deeper processing of information, easier memorizing, and faster reproduction, which create longer-lasting memory trails. Their implementation in memorizing religious knowledge had a positive effect on its level.

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Keywords: strategies of traditional memorizing, memorizing techniques, Link Mnemonic System, levels of processing, elaborative memorizing

INTRODUCTION

Mnemonics belong to elaborative techniques and are understood as "a group of measures and precepts, which aim to facilitate memorizing a difficult material (…). They rely on artificial linking of elements which are difficult to memorize with easier elements that were have already assimilated" (Stankiewicz, 1999, p. 33). Elaborative encoding, as described by Fiorella and Mayer (2015), promotes generative learning by encouraging students to actively reorganize and integrate new information with prior knowledge. They demand initializing an imaginal layer in the form of visualization and associative elements. The mnemonic approach supports elaboration and deeper processing of content – a process referred to as elaborative encoding, where new information is enriched and integrated with prior knowledge using analogies, categories, metaphors, or narrative structures (Fiorella & Mayer, 2015).

They demand initializing an imaginal layer in the form of visualization and associative elements. The mnemonics can be defined as ready-made templates, by which the brain can link information associatively. Their application improves concentration efficiently. The basic rule used in mnemonics is:

memory = action + image + positive emotions

The range of mnemonics is so vast, that discussing each of them would have been contrary to the objective of this article. The analysis shall focus on the Link Mnemonic System (LMS), which was used in the conducted research. The aim of using mnemonics is to efficiently memorize (Czerniawska & Ledzińska, 1986), and then reproduce numbers, dates, new concepts, foreign words, chronology of events, or textbook material.

The usage of mnemonics consists of creating interactive images, which link information that were previously not connected. For mnemonics to be used correctly and to deliver expected results in the form of effective memorization, certain conditions must be met. Among factors contributing to efficient memorizing is the usage of connotations characterized by: high dynamics, overexaggeration, miniaturization, absurdity, motion, and connotations concerning the learner (Dryden & Vos, 2003). Among the catalysts of good memorizing are also: moving, colorful, and positive images, polysensory images, creating connotations between images, a skillful use of exaggeration, categorizing, organizing, and using symbols.

The link technique used in this research is considered to be a primary method on the basis of which the students learn how to skillfully use other mnemonics. It is based on memorizing any material in determined order. Its fundament is using men-

tal images and connotations for merging further elements. To memorize material by using the discussed technique, information must be paired, connotations should be visualized and turned into a net of sequences and strings, to create a coherent story (Brześkiewicz, 1995; Buzan, 2003; Stankiewicz, 1999; Szurawski, 2004). This process often involves interactive imagery – dynamic mental representations where two or more elements are visualized in relation to one another, forming a meaningful connection. For example, imagining a prophet sitting on a mountain made of keys could symbolize the link between revelation and trust, thereby enhancing semantic integration. These techniques are not merely memory tricks, but deliberate cognitive strategies designed to enhance learning by facilitating the transfer of information into long-term memory through semantic and visual associations (Bellezza, 2019). In this article, the focus is on associative mnemonic strategies based on visual encoding, sometimes referred to as interactive or imagery-based techniques.

Link Mnemonic System can be used in various ways as a means to memorize, e.g.: information that has to be assimilated in a certain order; extensive material, which has been divided into sections; textbook and encyclopedic knowledge; texts from presentations and papers; poems; notes; lectures' content; timetables.

The literature emphasizes that effective learning requires not only access to content but also the development of students' cognitive self-regulation skills, including the use of strategies such as elaboration, information organization, and visual encoding (Fiorella & Mayer, 2015; Mayer, 2020). Mnemonic techniques, as a form of elaborative data processing, are increasingly being applied in the teaching of science and language subjects – whereas their presence in religious education remains marginal. Moreover, in the context of challenges related to overstimulation, attention deficits, and cognitive overload among students, methods that support active and structured knowledge encoding are gaining growing importance (Eitel & Kühl, 2020; Rawson & Dunlosky, 2021). The effectiveness of such mnemonic strategies has been supported by recent empirical findings, particularly in contexts involving declarative knowledge acquisition supported by visual materials (Eitel & Kühl, 2020). Moreover, contemporary reviews highlight that elaborative encoding, retrieval-based learning, and semantic structuring remain among the most promising techniques for promoting long-term retention and meaningful learning (Rawson & Dunlosky, 2021).

Previous research has demonstrated the effectiveness of mnemonic techniques in improving recall and comprehension across various subjects, including science and language education (Eitel & Kühl, 2020; Fiorella & Mayer, 2015). These techniques, grounded in elaborative encoding and visual association, have shown particular promise in facilitating long-term retention.

In light of these findings, it is reasonable to hypothesize that mnemonic techniques, which foster elaborative encoding and semantic integration, could be similarly effective in the domain of religious education. While previous studies

have primarily focused on science and language subjects, the potential for transfer of these strategies into the religious context remains underexplored. The current study seeks to address this gap.

RESEARCH AIM AND QUESTION

The aim of the research is to find the answer to the research question: Is there a difference in the level of religious knowledge of second-year high school students after implementing the innovative teaching method in the form of a mnemonic?; as well as to verify the hypothesis formulated on its basis: using the mnemonics has a positive effect on the level of religious knowledge of the researched youth.

By the creative use of action and emotions the mnemonics allow for a deeper processing of information, easier memorization, and faster reproduction, which creates more durable memory trails. Based on this it can be prompted, that the implementation of the mnemonics in the assimilation of religious knowledge will have a positive effect on its quality.

It should be noted that the cognitional factor of the cognitive aspect of religiousness does not end in the creation of religious knowledge. However, in the context of this article and the empirical verification conducted for researching the level of religious knowledge of secondary school students after implementing innovative and traditional teaching methods, the author limited herself only to the analysis of the knowledge-forming aspect.

RESEARCH METHOD AND SAMPLE CHARACTERISTICS

On the assumption of the research method, while understanding the implementation of the study, the solution of the research issue calls for a quasi-experiment (Kerlinger, 1986) of a natural character, which means that the phenomena were studied in their natural (school) environment, and none of the researched parties had to play an unnatural role; they could behave in a natural manner, which facilitated the interpretation of the results, which would be impossible in the laboratory experiment. Classic experiment was impossible to conduct due to technical issues, stemming from the general regulations concerning the functioning of the school, which excluded some essential (from the formal point of view) research criteria, that is random selection and strict control of the variables (Kowalczyk, 2016). In the quasi-experiment, according to the methodological approach, a pre-test was left out, leaving a post-test after the application of the experimental stimulus in the research and control groups. In both groups, a pre-test of general knowledge was conducted in order to determine the level of general knowledge

of the participants. The general knowledge pre-test administered prior to the intervention did not assess religious knowledge. Instead, it was designed to evaluate students' general knowledge across various subject areas that they were expected to have mastered by the end of primary school. The aim was to ensure baseline comparability between the experimental and control groups in terms of overall cognitive development and academic readiness.

The research involved 105 second-year students of a secondary school, where 58 students constituted the research group, while 47 students formed the control group. The selection of participants was based on the structure of existing class groups at a public secondary school. Students were not randomly assigned; instead, two pre-existing classes were selected to serve as the experimental and control groups. A general knowledge pre-test was conducted prior to the intervention to confirm that the groups were comparable in terms of baseline cognitive performance. The comparability of groups was further confirmed through statistical analysis of the general knowledge pre-test results. No statistically significant differences were found between the experimental and control groups, which supports the conclusion that the groups were cognitively equivalent at baseline and that any differences in post-test results can be attributed to the instructional intervention.

The experimental group participated in a didactic unit based on the LMS, which was introduced during one consecutive 45-minute religious education lesson. The content covered in both groups was identical and followed the core curriculum for religious education in Polish secondary schools, with a focus on topics such as conscience, sin, and moral decision-making. In the experimental group, students were first introduced to the principles of the LMS, including how to form associations through vivid, interactive mental images. Then, they worked individually and in pairs to create visual chains linking the concepts covered in the lessons.

In the control group, the same content was delivered using traditional teaching methods, including lecture, textbook work, and individual note-taking. Students were encouraged to memorize the content using their usual, self-developed strategies.

Both lessons – in the experimental and control group – were delivered by the same person: the principal investigator of the study. This individual is a qualified religious education teacher and certified trainer in effective learning strategies. Importantly, the instructor was not a regular teacher of the participating students, which helped to reduce potential biases related to existing teacher-student relationships.

Following the instructional phase, all participants completed the same post-intervention multiple-choice test consisting of eight domain-specific questions (W1–W8), each assessing knowledge and understanding of a specific aspect of the lesson content: W1: What are the characteristics of a person with a broad conscience?; W2: What defines a pharisaic conscience?; W3: What traits are typ-

ical of a person with a dulled conscience?; W4: What distinguishes a scrupulous conscience?; W5:What is a true conscience and how does it function?; W6: How does a false conscience operate?; W7: How can a certain (sure) conscience be described?; W8: What are the indicators of a mature conscience?. The test was designed by the researcher and validated through consultation with students' regular teacher.

STATISTICAL DATA ANALYSIS PROCEDURE

In the research the main explanatory (independent) variable was the application of innovative teaching method. The dependent variable was the level of students' religious knowledge, as measured by the number of correct answers provided in the post-test. To verify the level of religious knowledge of the second-year students after using traditional and innovative teaching methods, statistical analyses were conducted and a model of the variables' effect was created. The variables in question are *The teaching method* (traditional and innovative) and *Questions about the religious knowledge* of the second-year students. This affects another variable: *The number of correct answers* in a multiple choice test after the teaching. In the case of the multiple choice test concerning the mnemonic, the results proved to be higher than the traditional method, which is classic memorizing. The difference between the LMS and traditional memorizing turned out to be statistically significant $p < 0.001$.

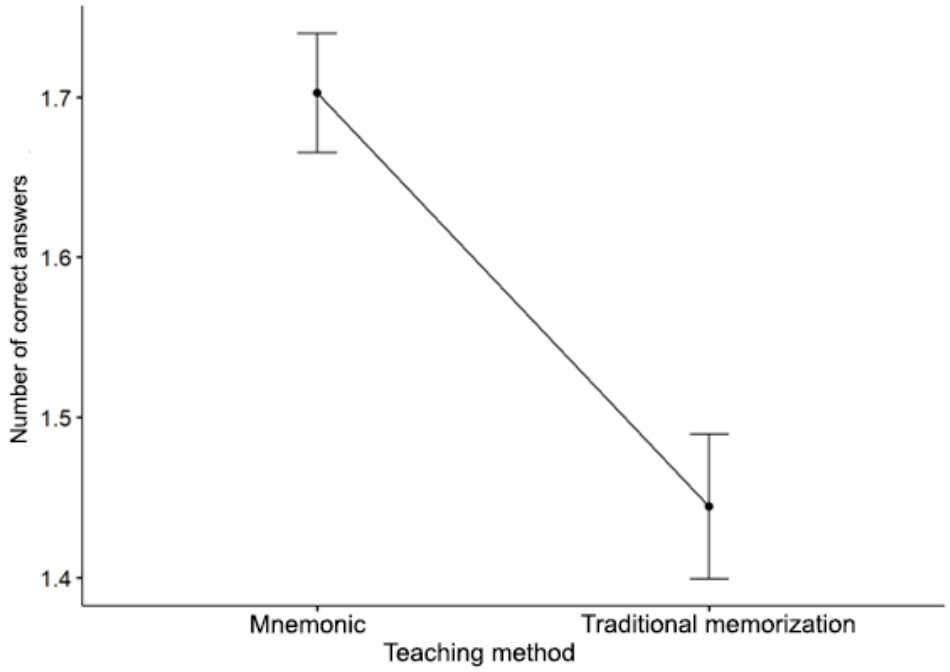
To verify the differences between the taken measurements and the groups in terms of the number of correct answers, a two-factor analysis of variance in the pattern for the mixed trials was conducted. The grouping factor in the analysis was a variable *Teaching method*, on two levels: in the research group – *Mnemonic*, and in the control group – *Traditional memorization*. An inter-object factor was a measurement of each question concerning religious knowledge of the second-year students done on 8 levels set by the questions of the multiple choice test, that was undertaken by the students after the teaching (the questions are marked with symbols: W1 B to W8 B).

RESULTS

The analysis of the primary effect of the research and control groups showed a significant influence of the grouping variable (*Teaching method*) that is a mnemonic (innovative method) and the classic memorization (traditional method), on the results of the *Number of correct answers* variable: $F(1, 103) = 24.15$; $p < 0.001$; $\eta^2 = 0.19$. The rate of the partial η^2 proved that the differences between tested groups

of the *Teaching method* variable (that is Mnemonic and Traditional memorization) clarified approx. 19% of the variance in the *Number of correct answers* variable. Nevertheless, in order to detect precise differences between the two groups, a comparative analysis was conducted. This analysis revealed that the difference between a mnemonic and traditional memorizing was statistically significant $p < 0.001$. The average intensity of the *Number of correct answers* variable was statistically more significant in the group taught using a *mnemonic* than in the group that used *traditional memorizing*. The intensity of these results was $M = 1.70$; $SD = 0.80$ vs. $M = 1.44$; $SD = 0.88$. Although the difference was statistically significant, the effect size was small (Cohen's $d = 0.31$). The results of this effect are provided in Figure 1 and Table 1. The number of correct answers given in the research group was considerably higher than in the control group.

Figure 1.
The effect of the Teaching method variable on the results of the number of correct answers variable in the multiple choice post-test in the second-year classes



Error bars show standard errors of the mean.
Source: Author's own study.

Table 1.
Descriptive statistics of the effect of the Teaching method variable on the level of results of the Number of correct answers variable

Group	*n*	*Min*	*Max*	*M*	*SD*	*SE*
Mnemonic	58	0	3	1.70	0.80	0.04
Traditional memorization	47	0	4	1.44	0.88	0.04

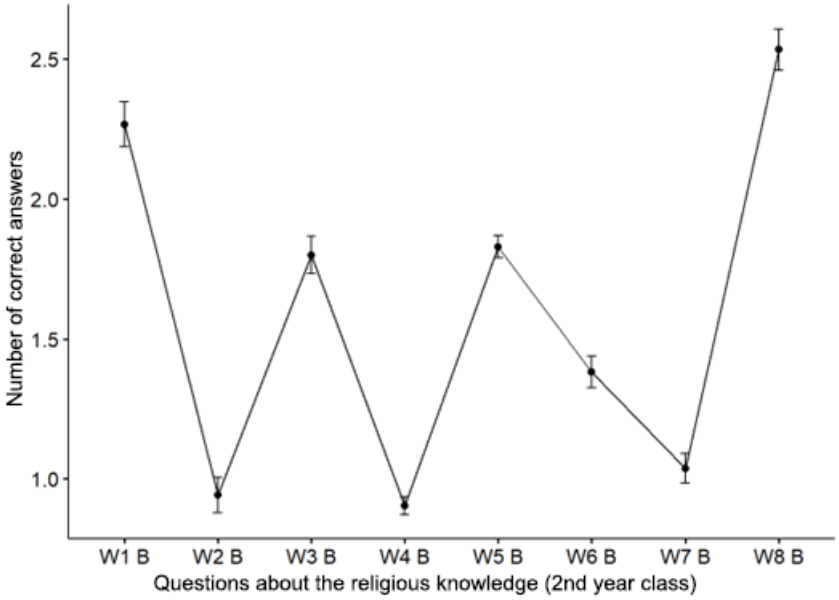
n = number of observations in the studied groups; *Min* = minimal value; *Max* = maximal value; *M* = arithmetical mean; *SD* = standard deviation; *SE* = standard error of the mean

Source: Author's own study.

The analysis of the primary effect concerning the measurements regarding the eight questions in the after-test showed significant differences between the measurements of individual questions in terms of intensity of the correct answers: $F(5.59, 575.91) = 121.60$; $p < 0.001$; $\eta^2 = 0.54$. The degrees of freedom were corrected using the Greenhouse-Geisser adjustment due to the violation of the sphericity assumption. The rate of the partial η^2 showed that the differences between tested measurements of the questions explicated ap. 54% of the variability concerning the correct answers. The results of this effect are shown in Figure 2 and Table 2. The most correct answers were given to questions W8 (regarding pointing out the determinants of a mature conscience) and W1 (concerning the characterization of a person with a broad conscience). The least correct answers were given to questions W2 (pharisaical conscience) and W4 (scrupulous conscience).

During statistical analysis the effect of interaction concerning the measurements of each test question with a teaching method. The analysis of the interaction effect regarding the aforementioned variables, that is *Questions about the religious knowledge* and *Teaching method* showed a considerable effect on the intensity of the *Number of correct answers* variable $F(5.59, 575.91) = 3.20$; $p < 0.01$; $\eta^2 = 0.03$. The rate of the partial η^2 showed that the simultaneous effect of both tested coefficients clarified approx. 3% of the variability concerning the correct answers. The results are presented in Figure 3 and Table 3. In all the cases, sans question W6 (false conscience) the number of correct answers was higher for the innovative method.

Figure 2.
Differences between the measurements of the individual questions in terms of the results of the Number of correct answers variable



Error bars show standard errors of the mean. Results refer to the combined data from both the experimental and control groups.

Source: Author's own study.

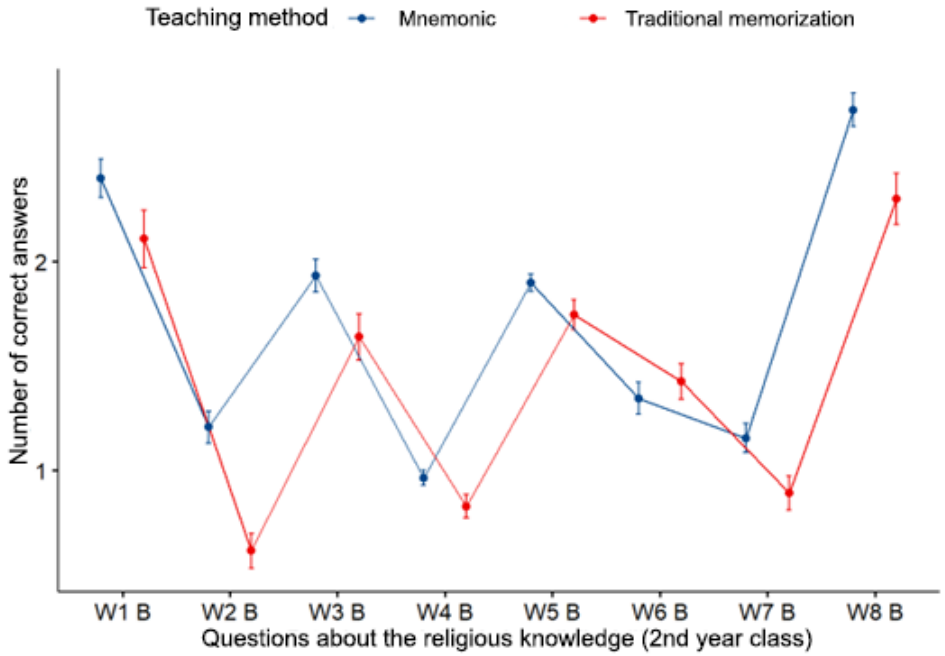
Table 2.
Descriptive statistics of the differences between measurements of individual questions in terms of the results of the Number of correct answers variable

Measurement	*n*	*Min*	*Max*	*M*	*SD*	*SE*
W1 B	105	1	4	2.27	0.82	0.08
W2 B	105	0	2	0.94	0.65	0.06
W3 B	105	0	3	1.80	0.69	0.07
W4 B	105	0	2	0.90	0.33	0.03
W5 B	105	0	2	1.83	0.40	0.04
W6 B	105	0	3	1.38	0.58	0.06
W7 B	105	0	2	1.04	0.55	0.05
W8 B	105	0	3	2.53	0.75	0.07

n = the number of observations in the studied groups; *Min* = minimal value; *Max* = maximal value; *M* = Arithmetical mean; *SD* = standard deviation; *SE* = standard error of the mean. Results refer to the combined data from both groups.

Source: Author's own study.

Figure 3.
The effect of the Teaching method variable on the results of the Number of correct answers variable in the measurements of individual questions



Error bars show standard errors of the mean.

Source: Author's own study.

Table 3.
Descriptive statistics of the effect of the Teaching method variable on the level of results of the Number of correct answers variable in the measurements of individual questions

Teaching method	Measure-ment	*n*	*Min*	*Max*	*M*	*SD*	*SE*
Mnemonic	W1 B	58	1	3	2.40	0.70	0.09
Traditional memorization	W1 B	47	1	4	2.11	0.94	0.14
Mnemonic	W2 B	58	0	2	1.21	0.58	0.08
Traditional memorization	W2 B	47	0	2	0.62	0.57	0.08
Mnemonic	W3 B	58	0	3	1.93	0.59	0.08
Traditional memorization	W3 B	47	0	3	1.64	0.76	0.11
Mnemonic	W4 B	58	0	2	0.97	0.26	0.03
Traditional memorization	W4 B	47	0	1	0.83	0.38	0.06

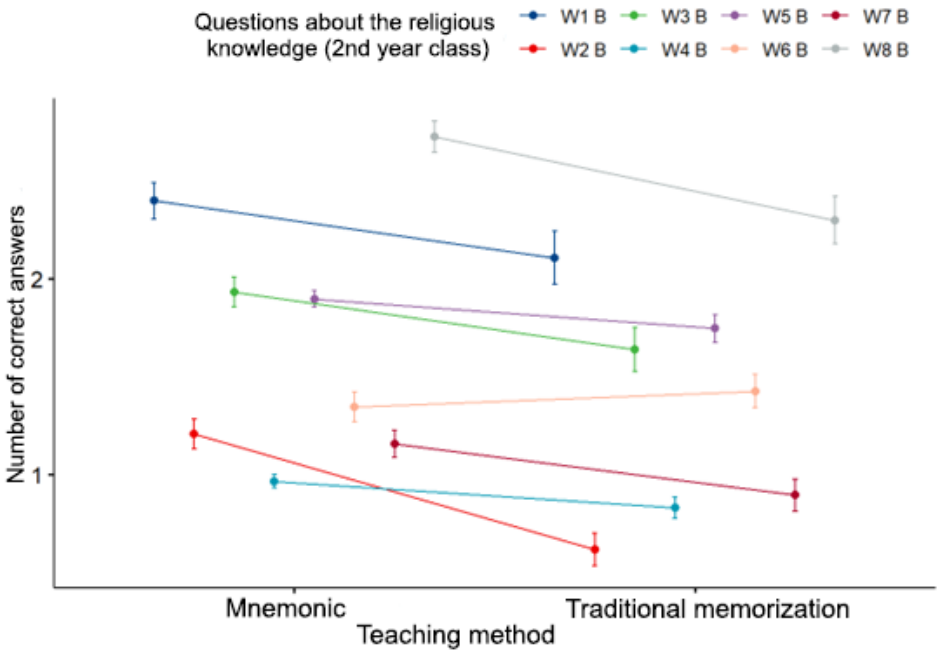
Mnemonic	W5 B	58	1	2	1.90	0.31	0.04
Traditional memorization	W5 B	47	0	2	1.75	0.49	0.07
Mnemonic	W6 B	58	0	2	1.34	0.58	0.08
Traditional memorization	W6 B	47	0	3	1.43	0.58	0.09
Mnemonic	W7 B	58	0	2	1.16	0.52	0.07
Traditional memorization	W7 B	47	0	2	0.89	0.56	0.08
Mnemonic	W8 B	58	1	3	2.72	0.62	0.08
Traditional memorization	W8 B	47	0	3	2.30	0.83	0.12

n = number of observations in the studied groups ; *Min* = minimal value; *Max* = maximal value; *M* = arithmetical mean; *SD* = standard deviation; *SE* = standard error of the mean

Source: Author's own study.

The aim of the conducted analyses was also to study the simple effect of the difference interaction between the measurements of the questions given to the research and control groups. In order to analyze the simple effect of the interaction, the performance on individual post-test questions (W1–W8) was examined separately within the experimental and control groups. The aim was to assess which questions were answered more or less accurately within each group, not to compare pre- and post-intervention scores. The general knowledge pre-test did not include religious content, and therefore was not used in this part of the analysis. The analysis of the results in the group in which a mnemonic was used showed significant differences between the measurements of the individual eight questions in terms of the number of correct answers: $F(5.7, 324.74) = 88.09$; $p < 0.001$; $\eta^2 = 0.61$. The rate of the partial η^2 showed that the differences between the tested measurements concerning the questions clarified approx. 61% of the result variability concerning the number of correct answers. The analysis of the results in the group, in which traditional memorization was used presented major differences between the measurements of the questions in terms of the number of correct answers: $F(5.05, 232.14) = 44.56$; $p < 0.001$; $\eta^2 = 0.49$. The rate of the partial η^2 showed that the differences between the tested measurements concerning the questions clarified approx. 49% of the result variability concerning the number of correct answers. The results are shown in Figure 4 and Table 4. In the case of question W6, the number of correct answers after implementing the innovative method was smaller than after using the classic memorization. However, in the case of the remaining question, an opposite phenomenon was noted. The biggest observed difference in the number of correct questions after implementing both the traditional and innovative methods concerned question W2 (pharisaic conscience).

Figure 4.
Differences between the measurements of individual questions in terms of the Number of correct answers in individual groups of Teaching method



Error bars show standard errors of the mean.

Source: Author's own study.

Table 4.
Descriptive statistics of the differences between the measurements of individual questions in terms of the results for the Number of correct answers in the specific groups of Teaching method

Teaching method	Measure-ment	*n*	*Min*	*Max*	*M*	*SD*	*SE*
Mnemonic	W1 B	58	1	3	2.40	0.70	0.09
Traditional memorization	W1 B	47	1	4	2.11	0.94	0.14
Mnemonic	W2 B	58	0	2	1.21	0.58	0.08
Traditional memorization	W2 B	47	0	2	0.62	0.57	0.08
Mnemonic	W3 B	58	0	3	1.93	0.59	0.08
Traditional memorization	W3 B	47	0	3	1.64	0.76	0.11
Mnemonic	W4 B	58	0	2	0.97	0.26	0.03
Traditional memorization	W4 B	47	0	1	0.83	0.38	0.06

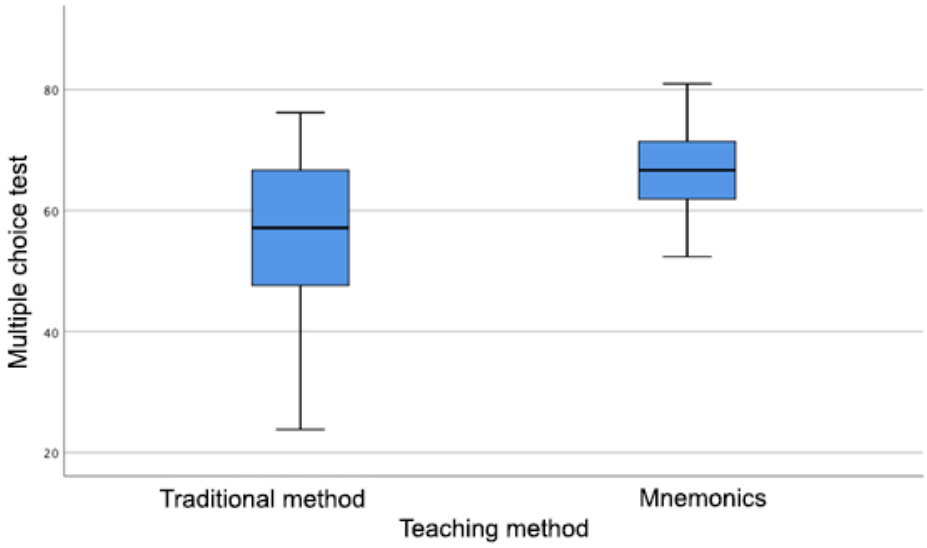
Mnemonic	W5 B	58	1	2	1.90	0.31	0.04
Traditional memorization	W5 B	47	0	2	1.75	0.49	0.07
Mnemonic	W6 B	58	0	2	1.34	0.58	0.08
Traditional memorization	W6 B	47	0	3	1.43	0.58	0.09
Mnemonic	W7 B	58	0	2	1.16	0.52	0.07
Traditional memorization	W7 B	47	0	2	0.89	0.56	0.08
Mnemonic	W8 B	58	1	3	2.72	0.62	0.08
Traditional memorization	W8 B	47	0	3	2.30	0.83	0.12

n = number of observations in the studied groups; *Min* = minimal value; *Max* = maximal; *M* = arithmetical mean; *SD* = standard deviation; *SE* = standard error of the mean

Source: Author's own study.

A Mann–Whitney *U* test was conducted to compare the percentage of correct answers between students using the mnemonic method and those using traditional or nonlinear techniques. The result was statistically significant ($p = 0.04$), indicating higher effectiveness of the mnemonic strategy. In the case of the multiple choice test, the mnemonic's results turned out to be higher than those of the traditional method (Figure 5).

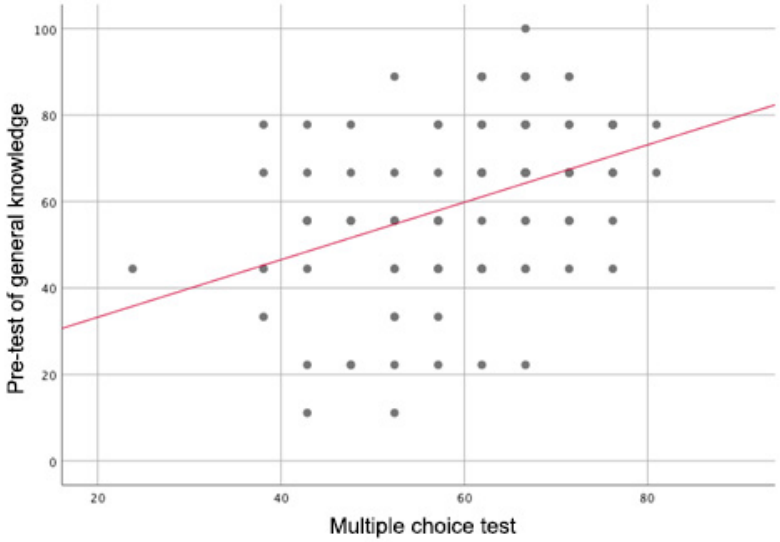
Figure 5.
The teaching method of the research participants and the percent of their correct answers in the multiple choice test (classic memorization and mnemonic)



Source: Author's own study.

Another statistically significant correlation concerned the percentage of correct answers for the pre-test of general knowledge with multiple choice test, filled in by the second-year class, $rs = 0.41$; $p < 0.001$. In this case, it is again a positive correlation. The more correct answers given in the pre-test of general knowledge, the more points earned in the open-question test, which is illustrated by Figures 6 and 7. Figure 7 presents also the percentage of correct answers obtained by students in the post-test, comparing the results between the groups using the LMS and the group using classic memorization strategies. The data reflect the overall effectiveness of the respective teaching methods.

Figure 6.
The correlation between the percent of the correct answers in the multiple choice test (second-year classes) and the general knowledge pre-test



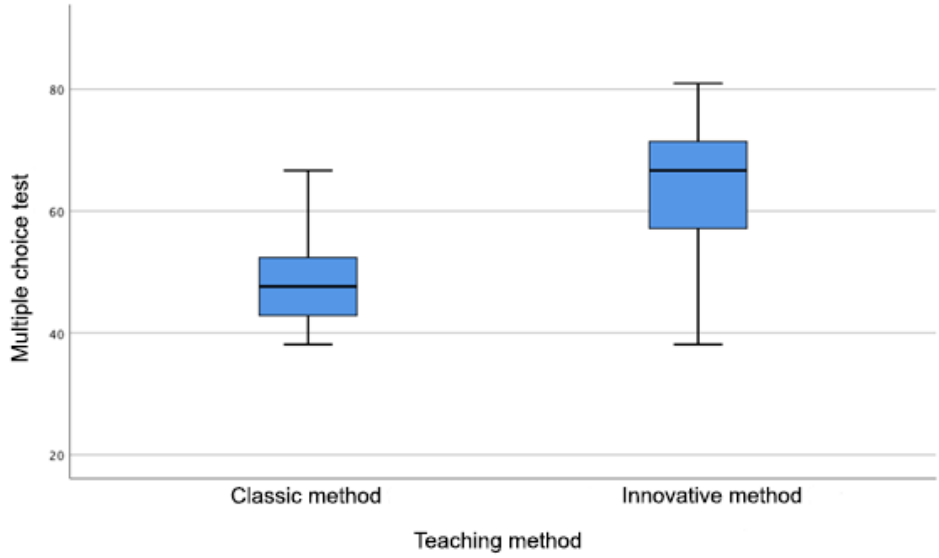
Source: Author's own study.

DISCUSSION

The discussed effects of the LMS suggest its potential usefulness not only in the cognitive but also in the didactic context. The obtained results support the assumptions regarding the impact of content organization on memory retention in school settings.

The general tendency resulting from the research shows that a mnemonic performs better in the majority of comparisons, especially regarding the questions that demand more complex answers. The efficiency of the quasi-experimentally

Figure 7.
Classic vs innovative teaching method of the research participants, and the percent of their correct answers in the multiple choice test (classic memorization and the LMS)



Source: Author's own study.

verified innovation in the process of teaching-learning can stem from the constituting: interactive mental images, elaborative processing of information, double coding, the phenomenon of self-reference, and relatively deeper processing of data. This process often involves interactive imagery – dynamic mental representations where two or more elements are visualized in relation to one another, forming a meaningful connection. For example, imagining a prophet sitting on a mountain made of keys could symbolize the link between revelation and trust, thereby enhancing semantic integration. The study was conducted in real school conditions in response to the actual didactic challenges related to the effective assimilation of declarative content by students. To enhance the relevance and theoretical anchoring of the findings, the article was supplemented with references to current research on cognitive strategies and elaborative techniques in formal education (e.g. Eitel & Kühl, 2020; Fiorella & Mayer, 2015; Rawson & Dunlosky, 2021), as well as publications from the field of educational neuroscience (Howard-Jones, 2014; Tokuhama-Espinosa, 2018). According to findings from neurobiological research, elaborative strategies such as linking, organizing, and visualizing material activate brain regions responsible for deep processing and durable information encoding (Howard-Jones, 2014).

Introducing pictorial elements to the memory of verbal material can be described as creating mental images. There is content, that can raise mental images

by itself, even without our will. Using mental images can also be a conscious strategy, used for better memorization of the content, just as it is in mnemonics (Foth, 1973; Jagodzińska, 1991; Morris et al., 1993). It can be safely said that mental images are the fundament of mnemonic systems.

The memory of terms and words depends on multiple factors, but the crucial one is conceivability. The easier it is to imagine something based on a word, the more effectively the word will be memorized. The words of a significant imaginal value are easier and more effectively memorized than words of a low imaginal value. This rule can also be translated into the process of learning complex materials, like whole texts or longer phrases (Richardson, 1980).

The fundament of using mnemonics, which guarantees their effectiveness is creating mental images. Many studies proved that it is a very effective tool for memorizing verbal material. During the research, the participants were instructed to use mental images while assimilating words (Morris & Stevens, 1974; Roedriger, 1980) associated pairs (Bower, 1970), sentences, and longer texts (Anderson & Kulhavy, 1972). However, it was discovered that not all mental images are equally effective.

The higher and better functionality of the memorizing techniques is rooted in interactive mental images. In the LMS, the basis for its proper use is imagining words in pairs in relation conceived by the learner. This is because interactive images have an advantage over isolated ones (Kroll et al., 1986). It stems from the fact that, in a way, interactive imagining merges two subjects into one image, in terms of relations and interaction. The precedence of interactive imaginings over the isolated ones, often used in so-called traditional memorizing methods, is highlighted especially during memorization of word pairs or bits of information, and in situations requiring not only serial but also chronological reproduction of assimilated material.

Another researched issue was the efficiency of normal and bizarre mental images. The mnemonics recommend that the images created during memorization should be at least to some extent quirky, abnormal; they should not lack elements of drollness or illogicality. The purpose of those measures is to guarantee better memorization of an image than it is in generic and banal connotations. In the conducted research two or three nouns were presented, along with an instruction to imagine a scene, in which these articulated words would interact with each other. During the verifying measurement, the respondents were given one word of the pair or triad, and their task was to recreate the missing words. Based on that research it was concluded that the oddity had a relatively weak effect on memorization. According to the researchers, the better effect on recreating information has the interactivity and distinctiveness of the images (McDaniel & Einstein, 1986).

The strength of the imaginal layer in the process of memorizing, as well as recalling information is supported by the conception of double coding (Jagodzińska, 1991; Paivio, 1986). Based on this, it can be considered a result of the coding re-

dundancy. In other words, coding of the same information in two systems ensures better durability of the memory. In case of the loss of representation in one system, there is a high probability of retaining it in the second system. What is more, it is easier to recreate memorized information, when it can be accessed from two levels (Jagodzińska, 1991). There is also the character of the pictorial system, which allows for the organization of information into homogeneous spatial structures, that function as a coherent whole and gives synchronous access to many detailed elements (Jagodzińska, 1991).

In this place, it should be noted that according to the single-coding theorists, the effects of the mental images stem from the general rules of the functioning of memory. They highlight the intensification of the focus during the creation of mental images and the elaborative information processing, organizing them analogously to interactive mental images.

Due to their intentionality and purpose, the mnemonics can be considered an exemplification of the intentional memorizing strategy. What is more, following the research results and Bartlett's conception, it was concluded that the memory processes have a constructive character. They rely on constructing memory representation, selection, interpretation, semantic integration, and assimilation into the cognitive patterns of the learner. Thus, the new information is developed and implemented in the context of previously acquired knowledge, which enables understanding and consolidating new information with the structures compatible with the cognitive patterns of the subject. Not without significance is the attitude and emotional disposition of the learner during the whole process. All the components of the constructive process are realized in the mnemonics, especially in the discussed LMS.

The efficiency of the use of mnemonics is also confirmed in the conception of the processing levels, otherwise known as processing depth. Its premise is that the representation of information in the memory is created as a by-product of the perceptual and cognitive operations conducted on a specific material. According to Craik and Lockheart, the memory trace is not a result of a special process of memory coding, but rather a record of such processes as understanding, categorizing, and differentiating (Craik & Lockheart, 1972). It indicates that the efficiency of the coding depends on the type and quality of conducted operations, which form a distinctive hierarchy (Lockheart & Craik, 1990).

The application of the LMS can be seen as a tool that supports students in independently organizing learning material, creating associations between facts, and transferring knowledge from short-term memory into the long-term store of declarative memory. In religious education – where a significant portion of content is abstract and symbolic in nature – techniques such as the LMS may assist learners in constructing internal structures of meaning.

A considerable role in the use of mnemonics plays the so-called self-reference effect, discovered during the research concerning the levels of information pro-

cessing (Jagodzińska, 1991). It appears that there is a supremacy of the content relating to the subject in the coding. Information that is personally important, such as living situation, self-evaluation, and other personal aspects is easier to remember (Klein & Loftus, 1998).

According to the researchers of the self-reference effect, its origins can be traced back to significant properties of the concept of "I", which is involved in deep information processing. By doing this type of task people hark back to the knowledge concerning themselves, which is not only a rich cognitive pattern (Kofta & Doliński, 2000) that enables a deeper elaboration and distinctiveness of the coding, but also organizes memorized information. Since the "I" pattern is characterized by high availability, it later helps in efficient recalling and recreating memorized content. In the context of using mnemonics, the self-reference effect applies pragmatically. Imagining a subject in a specific situation and relating it to personal experience increases the chance of successful memorization of the content (Matlin, 2003).

Recent research continues to confirm the effectiveness of elaborative and mnemonic strategies across various educational domains, including humanities and moral education. For example, studies by Ergas (2021), Holt (2022), or Carruthers and Ziolkowski (2021) emphasize the role of structured memory and imaginative encoding in fostering meaningful learning. These findings support the interpretation that mnemonic methods, when properly contextualized, can enhance not only retention but also the reflective depth of learning, which is particularly valuable in the context of religious education. Both the quantitative results and their interpretation in the context of previous research lead to conclusions that may hold relevance for both the theory of didactics and the practice of teaching.

CONCLUSION

Incorporating mnemonic techniques into didactic practice can serve not only to improve learning outcomes, but also to support the development of students' metacognitive skills and their sense of agency in the process of acquiring knowledge. The mnemonics, and in this context the LMS meet all the criteria of the elaborative coding, reinforced by the interactive mental images. The empirical verification of their efficiency in the area of religious knowledge proved that even such specific and abstract knowledge can be memorized using conscious memorizing strategies, that is mnemonics. The religious materials can be memorized through interactive mental images, which are more efficient than isolated imaginings. The depth of the processing, which is particularly important while using the LMS, affects the efficiency of the coding, which was proved by the research. In light of the obtained results and the theoretical foundations, it is worth considering the broader implementation of mnemonic techniques in the educational process. Inte-

grating mnemonics into teaching practice may serve not only to enhance learning outcomes, but also to foster students' metacognitive competencies and their sense of agency in the process of knowledge acquisition.

STUDY LIMITATIONS

A drawback, from which the limitation of the presented results could stem, is an imperfect choice of the research group, which was due to the class size and the general regulations concerning the functioning of the school. Moreover, a small test effect should be noted, since even though the test group consisted of 105 participants (58 in the research group, 47 in the control group) in some analyses the differences between the groups could be difficult to detect, especially for the effects of a small intensity (e.g. Cohen's $d = 0.31$). Coefficients of the effect (e.g. η^2 for the interaction effect of 0.03) point to a low potency of the effect in some of the analyses, which suggests that factors other than the teaching method could have influenced the results. Another consideration concerns the contextual scope of the study. While the research intentionally focused on the comparison between mnemonic and traditional memorization techniques, the findings reflect a specific instructional and cultural setting. Therefore, caution is warranted when applying the results to broader educational populations or curricula beyond religious education in Polish secondary schools.

Despite the aforementioned difficulties, it appears the aim of the study was achieved. The processing of the empirical data and drawn conclusions allow for a broader look at the field of religious education and the tools used.

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TECHNIKI PAMIĘCIOWE A POZIOM WIEDZY RELIGIJNEJ. ANALIZA BADAŃ EMPIRYCZNYCH MŁODZIEŻY LICEALNEJ

Wprowadzenie: Skuteczne strategie zapamiętywania odgrywają kluczową rolę w procesie nauki. Mnemotechniki, jako forma rozbudowanego zapamiętywania, oferują ustrukturyzowane podejście do poprawy przetwarzania informacji i ich późniejszego odtwarzania. Niniejsze badanie analizuje zastosowanie Łańcuchowej Metody Zapamiętywania w edukacji religijnej, porównując jego skuteczność z tradycyjnymi metodami zapamiętywania. Poprzez badanie wpływu strategii mnemotechnicznych na przyswajanie wiedzy przez uczniów klas drugich szkół średnich praca ta dostarcza cennych informacji na temat innowacyjnych metod nauczania, które mogą wspierać głębsze uczenie się i lepsze zapamiętywanie.
Cel badań: Celem badań była weryfikacja skuteczności innowacyjnej metody nauczania, tj. łańcuchowej metody zapamiętywania, zaimplementowanej do transferu wiedzy religijnej w porównaniu do tradycyjnych form memoryzacji wiedzy.
Metoda badań: Do przeprowadzenia badania wykorzystano metodę quasi-eksperymentu o charakterze naturalnym. Aby zweryfikować poziom wiedzy religijnej uczniów klas drugich po zastosowaniu klasycznej oraz innowacyjnej metody nauczania, przeprowadzono analizy statystyczne oraz stworzono model wpływu zmiennej, jaką jest *Metoda nauczania* (tradycyjna oraz innowacyjna) oraz jaką są *Pytania odnośnie wiedzy religijnej* uczniów klas drugich na wyniki zmiennej określonej jako *Ilość prawidłowych odpowiedzi* w teście wielokrotnego wyboru po nauczaniu.
Wyniki: Zaobserwowano diametralne różnice w poziomie wiedzy religijnej wśród uczniów, którzy do memoryzacji wykorzystali innowacyjną technikę zapamiętywania w porównaniu z uczniami, którzy przyswajali treść lekcji, stosując tradycyjną, uprzednio wypracowaną strategię zapamiętywania. Różnica pomiędzy Łańcuchową Metodą Zapamiętywania a zapamiętywaniem tradycyjnym okazała się istotna statystycznie $p < 0{,}001$.
Wnioski: Techniki pamięciowe poprzez twórcze wykorzystywanie akcji i emocji pozwalają na głębsze przetwarzanie informacji, łatwiejsze ich zapamiętywanie oraz szybsze reprodukowanie, tworząc trwalsze szlaki pamięciowe. Ich implementacja do przyswajania wiedzy religijnej miała dodatni wpływ na jej poziom.

Słowa kluczowe: strategie klasycznego zapamiętywania, techniki pamięciowe, Łańcuchowa Metoda Zapamiętywania, poziomy przetwarzania, zapamiętywanie elaboracyjne