Seminare

Non-linear Note-taking as an Innovative Method in Teaching Religion: Explication of the Concept and Analysis of Own Research

Notowanie nieliniowe jako metoda innowacyjna w nauczaniu religijnym. Eksplikacja pojęcia i analiza badań własnych

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Abstract: The development of knowledge about humans, including the cognitive mechanisms, accelerates the dynamics of changes in both the general and the specific didactics. The methods of teaching-learning that used to be effective are no longer sufficient today. The harmonious development of cognition and the concern for brain-friendly, that is, efficient education, is an incredibly weighty desideratum, which requires a deeper analysis. This article explains the nature and advantages of creating non-linear notes and presents an analysis of own research involving secondary school students and focusing on verification of their level of religious knowledge following the implementation of the innovative tool of non-linear note-taking. The presented results unambiguously indicate the effectiveness of mind mapping. The traditional forms of linear note-taking are characterized by numerous shortcomings and limitations, which reduce the effectiveness of the transfer, assimilation, and retention of knowledge. The educational potential of the presented tool, which supports the teaching and learning process, remains closely linked to the mechanisms of elaborative encoding and dual coding. Writing and making associations often constitute the core of cognitive dynamics. It is therefore advisable to create valuable, well-structured notes in a specific way due to their efficiency and expansiveness. From the perspective of religious teaching didactics (though not only limited to it), non-linear note-taking can constitute a valuable addition and diversification of the pedagogical toolkit of teachers.

Keywords: pedagogical innovation, non-linear note-taking, pedagogy of religion, level of knowledge, efficient teaching, elaborative encoding, dual coding

Abstrakt: Rozwój wiedzy o człowieku, w tym o mechanizmach kognitywnych, akceleruje dynamikę zmian w dydaktyce ogólnej oraz dydaktykach szczegółowych. Metody nauczania – uczenia się niegdyś uznawane za skuteczne okazują się niewystarczające. Harmonijny rozwój kognicji oraz troska o edukację przyjazną mózgowi, a tym samym skuteczną, to niezwykle ważki, wymagający pogłębionej analizy dezyderat. Niniejszy artykuł stanowi eksplikację istoty oraz walorów tworzenia notatek nieliniowych oraz analizę wyników badań własnych młodzieży szkół średnich w kontekście weryfikacji poziomu wiedzy religijnej po implementacji narzędzia innowacyjnego w postaci notatki nielinearnej. Zaprezentowane wyniki badań jednoznacznie wskazują na skuteczność tzw. mind mappingu. Tradycyjne formy notowania linearnego charakteryzują się wieloma mankamentami i defektami, obniżając efektowność transferu, asymilacji oraz memoryzacji wiedzy. Potencjał edukacyjny

tkwiący w prezentowanym narzędziu wspomagający proces nauczania – uczenia się pozostaje ściśle powiązany z mechanizmami kodowania elaboracyjnego oraz podwójnego kodowania. Zapisywanie i konotowanie niejednokrotnie stanowią rdzeń dynamizmu poznawczego. Dlatego ze względu na wydajność i skuteczność pożądany jest odpowiedni sposób sporządzania wartościowych notatek. Z punktu widzenia dydaktyki nauczania religii choć nie tylko, notowanie nieliniowe może stanowić cenne rozwinięcie i urozmaicenie warsztatu pedagogicznego nauczycieli.

Słowa kluczowe: innowacje pedagogiczne, notowanie nieliniowe, pedagogika religii, poziom wiedzy, skuteczne nauczanie, kodowanie elaboracyjne, podwójne kodowanie

Introduction

Organizing effective support and efficient learning in the field of religious education in schools remains an ongoing educational challenge. Even casual observation of teaching practices reveals that much still needs to be done to improve the effectiveness of knowledge transfer, as evidenced by the rising level of religious knowledge, one of the aspects of religiosity. It should be emphasized that religiosity inherently encompasses an affective element, manifested in attachment to religion, as well as a behavioural element, expressed in adoption of appropriate behaviours. Moreover, the cognitive dimension of religiosity extends beyond mere acquisition of religious knowledge. However, within the scope of this article and the empirical study conducted to assess the level of religious knowledge among secondary school students following the use of both innovative and traditional teaching methods, the author has limited the analysis to the knowledge-forming dimension only.

The aim of this article is to present the findings of the author's own research on secondary school students' level of religious knowledge after employing an innovative teaching tool – the mind map. The discussion is carried out through a theoretical analysis of the components of the formulated problem and a review of the author's own research findings.

The undeniable uniqueness of non-linear note-taking, especially in the context of religious education, lies in its inherent potential to enhance the effectiveness of religious instruction, an improvement that is greatly needed. The conducted research clearly confirmed the effectiveness of this method, which derives from cognitive mechanisms triggered through its use, specifically elaborative encoding and dual coding, as confirmed by empirical verification.

1. Non-linear note-taking: General characteristics and application

It seems reasonable to state that note-taking accompanies various intellectual activities aimed at the memorization of specific knowledge. As such, this activity is performed during school lessons, academic lectures, workshops, training sessions, and conferences. When carried out deliberately and thoughtfully, it enhances mental efficiency.

Traditional forms of note-taking are marked by numerous shortcomings and deficiencies. The first is undoubtedly their excessive length, caused by an overabundance of words, within which students may become confused and lose

the ability to concentrate and their motivation to learn. This stems from the need to read through unnecessary words and sentences in order to reach the primary keywords. Such a format acts as an inhibitor and anti-stimulant for the brain's creative work. Within these traditional notes, two further negative catalysts can be identified. One results from excess and consists of unreflective note-taking – writing down nearly everything without discernment. The other stems from deficiency and involves a lack of skill in selecting important facts, which can lead to abandoning note-taking altogether or producing notes that are fragmented and therefore insufficient (Farrand, Hussain, & Hennessy 2002, 426-431).

The argument of visual theory mentioned above further supports the claim that graphic forms such as mind maps make information not only memorized but also retained for an additional reason. They transfer information to memory more effectively than text alone by carefully and clearly arranging individual elements in the form of keywords, as well as through their spatial layout and interconnections. In doing so, they engage fewer working memory resources and require fewer cognitive transformations. The cognitive effectiveness of mind mapping has been scientifically verified by Farrand, Hussain, and Hennessy (Farrand, Hussain & Hennessy 2002, 232-233). Their study, conducted on a group of 50 second- and third-year medical students, revealed that the use of mind maps as a learning tool improves the quality of content recall one week after reading a text.

Writing and annotating often constitute the core of cognitive dynamism during reading. A desirable approach, both in terms of efficiency and expansiveness, is the ability to take meaningful and well-structured notes. The didactic process should encourage students to independently create their own frameworks and organize notes. The note-taking process must be creative rather than merely reproductive, as the dynamics of creativity consistently enhance cognitive effectiveness. It is also advisable to develop the habit of organizing and categorizing notes, as well as incorporating drawings, personalized markers, tables, or diagrams.

Mind maps (Szafranowska 2008), also known as non-linear notes, interactive notes, or multidirectional notes, represent one of the most interesting and creative forms of noting. As early as in previous studies (Buzan 2001), the effectiveness of mind maps as a tool for activating memory was already emphasized. The creator and unmatched promoter of this form of note-taking is Tony Buzan (Buzan 2014), one of the leading authorities in the field of cognitive brain functioning, learning techniques, and memory enhancement. Mind maps are a realization of synergistic and multidirectional thinking (Forzpańczyk 2015, 232). They are a graphic technique that efficiently exploits the potential of the note-taker. Moreover, they can serve as a tool for overcoming educational barriers, particularly for students struggling with cognitive dysfunctions such as dyslexia or attention deficits (Weyhreter 2004).

Mind maps are nothing more than visualized and non-linear representations of intellectual concepts and the connections and relationships between them. During traditionally conducted lessons or lectures, where conventional and transmission-based methods prevail, learners are overwhelmed by a multitude of information,

among which they struggle to find any connections or links to previously acquired material. Mind maps help prevent such problems because key concepts and their relationships are clearly laid out on the page, enabling students to recognize what is truly important and how individual elements complement one another to form a logical and coherent whole. They even consider complex, non-linear relationships as well as references and elaborations that go beyond the core subject matter. It follows, then, that presenting content graphically enables the process of reasoning more effectively than text alone (Robinson & Kiewra 1995, 455-467; Winn 1991, 211-247). Moreover, creating non-linear notes allows knowledge to be organized clearly and transparently, providing students with coherent, meaningful, and ready-to-use segments for storage and later recall. Without a logical, rational, and properly structured organization, knowledge becomes distorted and degraded to the level of marginal facts that are easily forgotten (Svinicki 2004). In the context of the effectiveness of mind maps as a tool for supporting the assimilation of material, it is also important to consider how content is received by the student. As Włodarski (1998b) points out, the effectiveness of the didactic process depends not only on the structure of the message itself but also on the learner's cognitive activity and their ability to extract key information from the overall educational content. This kind of selection and organization of content – characteristic of mind maps – fosters deeper processing and increases the likelihood of long-term retention.

Moreover, by incorporating colours, keywords, and pictograms, mind maps engage both hemispheres of the brain, thereby enhancing its cognitive potential (Biktimirov & Nilson 2006, 72; Szyndler 2014). Structurally, mind maps resemble a tree. Their creation involves the use of colourful pens, pictographic techniques, and keywords. This method is particularly beneficial for individuals whose dominant cognitive preference is visual – commonly referred to as visual learners (Biktimirov & Nilson 2006, 73). Since cognitive preferences significantly influence an individual's overall learning style, they should be consciously considered by all educators, teachers, tutors, and catechists. Doing so encourages the use of diverse didactic methods, enabling students to achieve their best possible outcomes.

Using spatial relationships, colours, codes, and pictograms, non-linear note-taking illustrates how concepts, ideas, or processes are interdependent – reaching learners who perceive the world and its phenomena in an impressionistic and spatial manner (Clark & Paivio 1991, 149). Such visual aids support internalization of knowledge, enabling a shift from surface-level understanding to deeper cognitive processing. In line with the theory of visual arguments, it can be stated that all forms of spatial graphs are effective due to their ability to present and convey information not only through individual elements but also through their spatial distribution (Larkin & Simon 1987, 65-100).

The conclusion regarding the numerous advantages of mind maps seems self-evident. Their usefulness becomes particularly apparent in today's world, where nearly everyone struggles with a lack of time, and the accelerating pace of development across all areas of life demands rapid yet accurate problem-solving, creativity, time

management skills, as well as the capacity to lead teams or projects while setting and efficiently achieving goals. Moreover, competencies such as clear articulation of ideas and thoughts, the ability to learn quickly and effectively, and the capacity to retain and integrate knowledge form a core skill set – without which achieving educational and life success becomes, if not impossible, then certainly far more challenging.

On the other hand, mind maps can be described as universal tools that enhance intellectual efficiency across a wide range of domains. These include attention and focus, multidirectional, abstract, and synergistic thinking, creativity, rapid and effective learning, levels of intelligence, and the development of multiple intelligences (Gardner 2002; Suświłło 1994). They also support planning and organizational activities, stimulate intrinsic motivation (Lock 2004; Niebrzydowski 1972; Reykowski 1977), and improve decision-making abilities (Forzpańczyk 2015, 232-233).

The practical applications listed clearly imply the value of this form of intellectual activity. Through skilful use of the tool, students gain the opportunity to enhance their cognitive efficiency (Davis 2001) by consolidating knowledge more rapidly, improving concentration, and developing the ability to properly select, organize, and structure information in a clear and coherent format. By using keywords, the learner retains key information, ideas, or theses, and the graphic form in which the non-linear note is created becomes a ready-to-encode learning material. Moreover, mind mapping enables radial thinking – that is, multidirectional and conceptual thinking – which significantly enhances the cognitive potential of the human mind (Dryden 2003, 5-60). Bjorklund (1985) points out that the development of conceptual knowledge plays a crucial role in the ability to organize material in memory, a process effectively supported by the use of non-linear notes. Therefore, if it is also the concern of religious educators to convey content meaningfully and to seek methods that aid learners in retaining it, especially when they are inundated with vast amounts of information to absorb or update, it is worth considering enriching their teaching toolkit with such an effective strategy as non-linear note-taking.

Moreover, a mind map can serve as a creative form of thought expression that fully engages attention – an aspect of great importance, especially for students experiencing cognitive difficulties (Clauss 1987; Davis 2001). This is due to the fact that such notes contain only key information. As a result, a well-constructed mind map clearly highlights what is essential. Furthermore, its graphic format facilitates the decoding of meaningful connections between individual keywords and the content they represent. These advantages point to the invaluable filtering function of non-linear note-taking. The formal requirement to use only keywords in creating mind maps also allows for relatively easy memorization of the specific knowledge to be acquired.

Analysing the impact of creating spatial notes on knowledge retention, one cannot overlook the influence of handwriting, which remains dominant in classrooms, on the ability to remember the recorded material. Aleksandra Sanigórska, together with Monika Kaźmierska, conducted a study examining the quality of memory retention depending on the writing techniques employed. The study anticipated that handwriting would have an advantage over computer-based writing. The analysis

revealed a difference between the groups in the number of recalled items, approaching statistical significance. The group writing by hand achieved higher results than the group using a computer. It can thus be inferred that, because handwriting engages visuomotor memory and requires more time to write a given phrase, information processing is prolonged and involves additional motor processes – all of which contribute to better memory retention (Sanigórska & Kaźmierska 2021, 119-126).

Another unquestionable advantage of mind mapping, considered both as a teaching and learning method (Bubrowiecki 2010), is its potential use as a tool for reviewing material. A commonly overlooked truth in the educational process is the fact that learning is not just about memorizing a specific portion of material. For it to be permanently assimilated, a system of reviews is essential; without such reinforcement, the retained content will atrophy and fade from memory (Henderson 2005).

A distinctive feature of mind mapping, and one that contributes to its effectiveness is the organization of material, which involves giving content a structure that facilitates learning and aligns with the learner's cognitive framework. Creating a non-linear note by seeking connections – including spatial ones – between elements, grouping, arranging and categorizing them, all of which align with the definition of structured learning. This can involve various relationships: external similarities, spatiotemporal sequences, or cause-and-effect links (Jagodzińska 2008, 241-242).

Following Z. Włodarski's research, it should be stated that structured organization serves as a factor that strongly modulates memory performance (Włodarski 1985; 1998a). Firstly, organized, that is, systematized material becomes easier to remember than scattered or chaotically disorganized material. Secondly, individuals who structure material engage in the process of structuring content, which leads to better results in both recognition and reproduction of the material (Bousfield 1953, 229-240). W. A. Bousfield found that the tendency to arrange content is so strong that even in the absence of clear conceptual relationships, people impose their own subjective frameworks, perceiving similarities and connections. The criteria used for such structuring are often highly subjective (Tulving 1962, 344-354). Mind maps share the same characteristic, though subjectivity in organization does not imply randomness.

Structuring in general, as well as the distinctive form of arrangement characteristic of mind maps, occurs in various forms – grouping, chunking, and ordering. Grouping involves clustering similar elements based on criteria selected by the person structuring information. A variant of grouping is chunking, which consists of combining individual elements into meaningful units. Chunking information is a tool that helps optimize the use of short-term memory capacity and facilitates long-term encoding of information. An example of chunking is combining letters into syllables and syllables into words. Another form of grouping is ordering, which involves arranging elements according to a chosen principle, such as chronological sequence of events.

In mind maps, organizing involves forming a specific, concentric structure of content. Detailed information is grouped around the central topic. A high level of

material organization, achieved through well-constructed mind maps, has a strong impact on memory, particularly when the arrangement of the non-linear note is based on meaningful relationships between pieces of information and is tailored to the cognitive structures of the person creating it. This finding aligns with Włodarski's research, which indicates that the higher the degree of content organization, the better the recall — a phenomenon known as the structure effect (Włodarski 1998a, 10-20). The effect is further reinforced by elements that emphasize structure – in the case of mind maps, through spatial arrangement and text layout, and just as importantly, through the active engagement of the person constructing the map. The specific conditions influencing the structure effect depend on multiple factors, including the type of content, learning objectives, and the individual characteristics of the learner.

2. Non-linear note-taking as a tool for elaborative and dual coding

Undoubtedly, the process of non-linear note-taking can be classified as a form of elaboration, that is, the active processing of material. This view is supported by the fact that creating such notes involves contextual analysis of new information in relation to previously acquired knowledge, thereby deepening understanding, and forming connections within a broader knowledge system. Learning through the use of mind maps requires deeper levels of information processing. According to Craik and Lockhart's levels-of-processing framework, only elaborative processing leads to a stronger memory trace (Craik & Lockhart 1972, 671-684). Mind maps, and the cognitive processes closely tied to their creation – organizing, rehearsing, verbalizing, and often generating imagery (essential, for example, for creating pictograms) – render this technique particularly effective. It is precisely through elaborative encoding that learning occurs, understood as the integration of new content with previously acquired knowledge. Thus, elaboration plays a particularly important role in memorizing complex content, such as that found in textbooks (Czerniawska 1999). In many cases, understanding the content alone suffices for it to be remembered. The same applies when reading and creating a mind map simultaneously. The act of producing a mind map requires the use of keywords and the creative, active search for connections – both among those words themselves and between them and previously acquired knowledge – a process constituting elaborative encoding (Jagodzińska 2008, 235). For this process to occur, the meanings embedded in the text must first be decoded. Therefore, the process of producing non-linear notes can be regarded as a form of elaboration. It should also be noted that such elaboration results in the formation of numerous connections between elements of knowledge, which in turn facilitates their subsequent retrieval.

Moreover, creating elaborative non-linear notes can function as a memory strategy. A memory strategy may be defined as a set of intentional actions undertaken to recall, support or enhance memory performance. For a process to qualify as a memory strategy, the individual must engage in it with the explicit

intention of facilitating or improving the execution of a memory task (Jagodzińska 2022, 28-38). Through the deliberate processing of information in relation to the learner and under their active control, non-linear note-taking, when conceptualised as a memory strategy, maximizes cognitive efficiency.

When considering any of the leading scientific theories, it becomes clear that properly constructed mind maps are virtually unforgettable. In support of dual coding theory, discoveries and research findings from neuroscience and cognitive psychology indicate that people process and store verbal and visual-spatial information in separate cognitive systems, referred to respectively as semantic memory and episodic memory. The literature also suggests that graphical representations of verbal material, such as mind maps, facilitate learning by allowing learners to store knowledge in both systems, rather than solely in the one responsible for encoding linguistic forms. Information acquired through both modalities, that is, verbal and visual, is typically retained more effectively and for longer than information acquired in only one form. Moreover, it can be accessed and manipulated through both channels (Paivio 1971; 1990; Svinicki 2004; Vekiri 2002, 261-312).

3. Level of religious knowledge and non-linear note-taking

In the research I conducted on the effectiveness of non-linear note-taking, I formulated the following research problem and the corresponding hypothesis:
Research Problem:

Is there a difference in the level of religious knowledge among third-year secondary-school students following the implementation of an innovative teaching method in the form of non-linear note-taking?
Hypothesis:

The use of non-linear note-taking results in an increase in the level of religious knowledge among the students studied.

Analysing the results obtained in the study of third-year secondary-school classes, a model was developed to examine the influence of two variables – Teaching method and Questions on religious knowledge – on the outcome variable Accuracy of responses to open-ended questions posed to respondents after a lesson on bioethics, specifically concerning organ transplantation. The traditional method employed was classic (or linear) note-taking, while the innovative method was mind mapping. The accuracy of responses to the questions included in the open-ended test was found to be higher when the innovative method was used.

To verify the differences between measurements and between groups (control group and study group) in terms of the variable relating to response accuracy, a two-way mixed-design analysis of variance was conducted. In this analysis, the grouping factor was the Teaching method variable, with two levels: Mind map in the study group and Traditional note-taking in the control group. As a within-subject factor, the analysis incorporated the measurement of responses to five consecutive open-ended questions from the post-instruction religious knowledge test (labelled from O1 B to O5 B).

The analysis of the effectiveness of non-linear note-taking versus Traditional note-taking proved to be statistically significant ($p < 0.001$). The analysis of the main effect, namely, the influence of the teaching method (traditional vs. innovative), revealed a significant impact of the grouping variable, i.e., the selected teaching method, on the accuracy of responses: $F(1, 83) = 27.06$; $p < 0.001$; $\eta^2 = 0.25$. The partial η^2 coefficient indicated that the differences between the tested groups for the Teaching method variable, with the study group using mind maps and the control group using Traditional note-taking, accounted for approximately 25% of the variance in the Accuracy of responses variable. Nonetheless, to identify the specific differences between the compared groups, a post hoc comparison analysis was conducted. The analysis showed that the difference between Mind Map and Traditional note-taking was statistically significant ($p < 0.001$). The average level of response accuracy in the group taught using the innovative method was significantly higher compared to the group where the lesson was conducted solely with the classical method of traditional note-taking. The statistical analysis revealed that the mean scores were $M = 2.49$, $SD = 0.75$, and $M = 2.05$, $SD = 1.06$. The strength of the difference between these groups was small, with a Cohen's d of 0.48.

The results for this effect are presented in Figure 1 and Table 1.

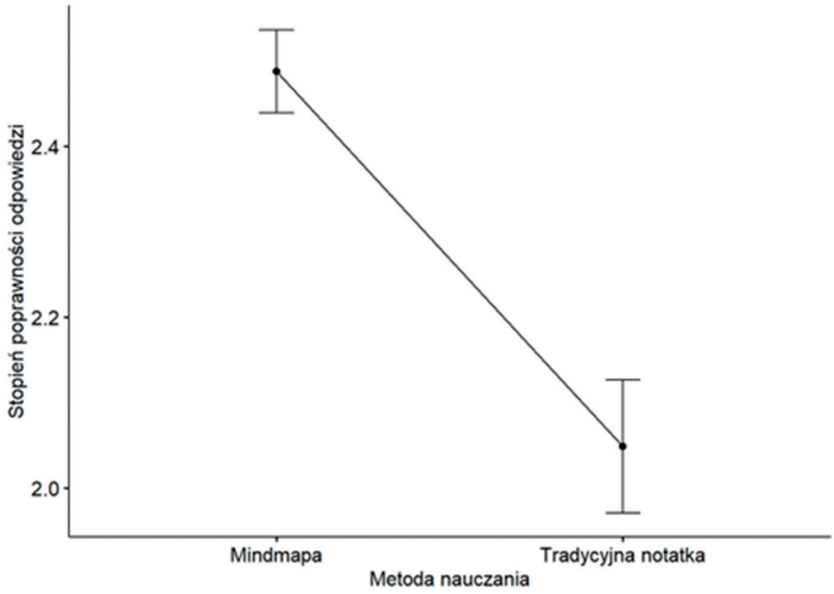


Figure 1. The impact of the variable Teaching Method (Mind Map and Traditional note-taking) on the outcome variable Accuracy of Responses in the open-ended post-test. Error bars represent standard errors of the mean.

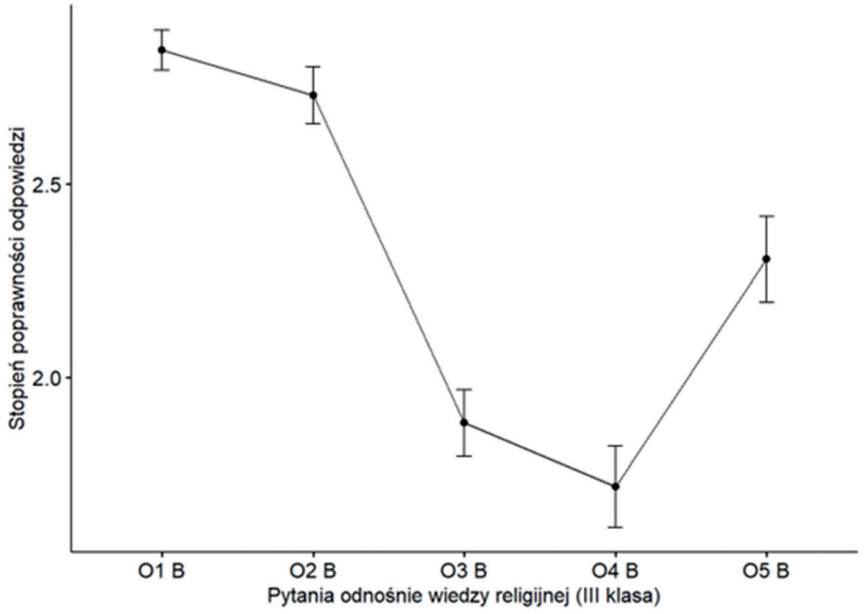
Table 1. Descriptive statistics of the impact of the variable Teaching method on the outcome variable Accuracy of responses

Group	n	Min	Max	M	SD	SE
Mind map	48	0	3	2.49	0.75	0.05
Traditional note-taking	37	0	3	2.05	1.06	0.08

Note: n = Number of observations in the studied groups; Min = Minimum value; Max = Maximum value; M = Arithmetic mean; SD = Standard deviation; SE = Standard error of the mean.

The analysis of the main effect for the accuracy of responses to individual questions revealed significant differences between the five measurements in terms of the degree of response accuracy: $F(3.29, 272.97) = 38.77$; $p < 0.001$; $\eta^2 = 0.32$. The partial eta-squared (η^2) coefficient indicated that the differences between the tested question measurements accounted for approximately 32% of the variance in the Accuracy of responses variable. The results for this effect are presented in Figure 2 and Table 2.

Figure 2. Differences between the measurements of individual questions in terms of the Accuracy of responses variable



Note: Error bars represent standard errors of the mean.

Table 2. Descriptive statistics of the differences between the measurements of individual questions in terms of the Accuracy of responses variable

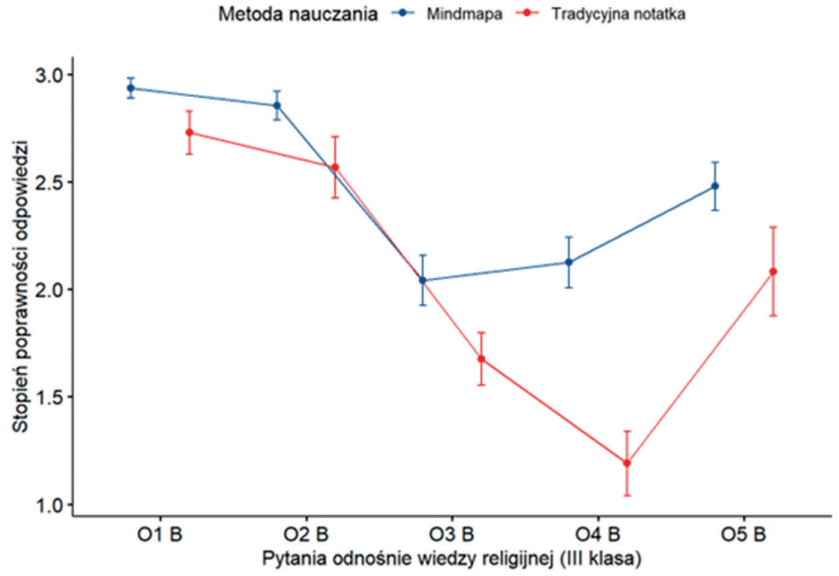
Measurement	N	Min	Max	M	SD	SE
O1 B	85	0	3	2.85	0.48	0.05
O2 B	85	0	3	2.73	0.68	0.07
O3 B	85	0	3	1.88	0.79	0.09
O4 B	85	0	3	1.72	0.97	0.10
O5 B	85	0	3	2.31	1.02	0.11

Note: n = Total number of observations; Min = Minimum value; Max = Maximum value; M = Arithmetic mean; SD = Standard deviation; SE = Standard error of the mean

An analysis of the interaction effect between the variable Question on religious knowledge and the variable Teaching method (non-linear note-taking or traditional note-taking) was also conducted. The analysis revealed a significant effect of both factors on the intensity of the variable Accuracy of responses: $F(3.29, 272.97) = 3.03$; $p < 0.05$; $\eta^2 = 0.04$. The partial eta-squared (η^2) coefficient indicated that the combined influence of both examined factors accounted for approximately 4% of the variance in the Accuracy of responses variable. The results are presented in Figure 3 and Table 3.

The graph illustrates the greater didactic effectiveness of the modern noting method. The arithmetic mean of responses is higher for each open-ended question when the innovative method is applied.

Figure 3. The impact of the variable Teaching method on the outcome variable, Accuracy of responses across individual question measurements



Note: Error bars represent standard errors of the mean.

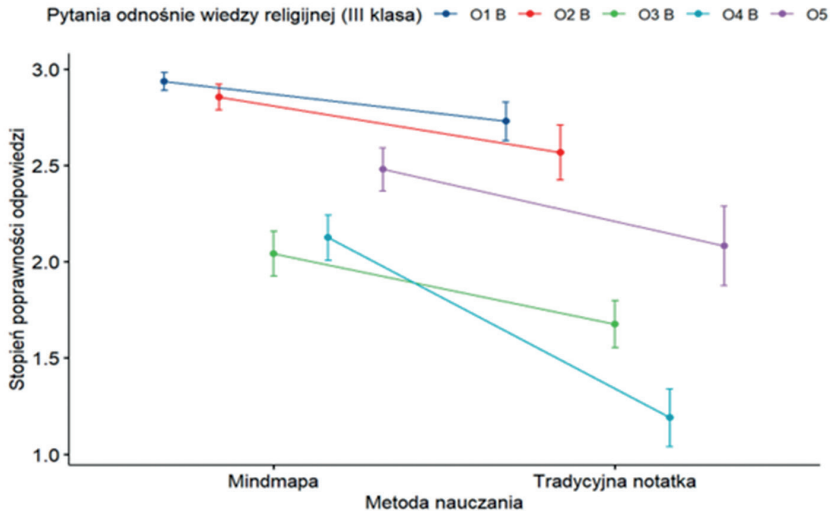
Table 3. Descriptive statistics for the impact of the variable Teaching method on the outcome variable Accuracy of responses across individual question measurements

Teaching method	Measurement	n	Min	Max	M	SD	SE
Mind map	O1 B	48	1	3	2.94	0.32	0.05
Traditional note-taking	O1 B	37	0	3	2.73	0.61	0.10
Mind map	O2 B	48	1	3	2.85	0.46	0.07
Traditional note-taking	O2 B	37	0	3	2.57	0.87	0.14
Mind map	O3 B	48	0	3	2.04	0.80	0.12
Traditional note-taking	O3 B	37	0	3	1.68	0.75	0.12
Mind map	O4 B	48	1	3	2.12	0.81	0.12
Traditional note-taking	O4 B	37	0	3	1.19	0.91	0.15
Mind map	O5 B	48	0	3	2.48	0.77	0.11
Traditional note-taking	O5 B	37	0	3	2.08	1.26	0.21

Note: n = Total number of observations; Min = Minimum value; Max = Maximum value; M = Arithmetic mean; SD = Standard deviation; SE = Standard error of the mean

The analysis of results within the group taught using the modern method of mind mapping revealed significant differences between measurements for individual questions in terms of response accuracy: $F(3, 141) = 18.27$; $p < 0.001$; $\eta^2 = 0.28$. The partial eta-squared (η^2) indicated that the differences between the five measured questions explained approximately 28% of the variance in the variable Accuracy of responses. Similarly, the analysis of results in the group taught using the traditional note-taking method showed significant differences between question measurements in terms of the intensity of the variable Accuracy of responses: $F(3.09, 111.32) = 20.11$; $p < 0.001$; $\eta^2 = 0.36$. The results are presented in Figures 4 and Table 4. In each question, a clearly higher level of response accuracy was observed following the application of mind mapping.

Figure 4. Differences between measurements for individual questions in terms of the



variable Accuracy of responses across the groups defined by the Teaching method

Note: Error bars represent standard errors of the mean.

Table 4. Descriptive statistics for the differences between measurements of individual questions in terms of the Accuracy of responses score across different Teaching method groups

Teaching method	Measurement	n	Min	Max	M	SD	SE
Mind map	O1 B	48	1	3	2.94	0.32	0.05
Traditional note-taking	O1 B	37	0	3	2.73	0.61	0.10
Mind map	O2 B	48	1	3	2.85	0.46	0.07
Traditional note-taking	O2 B	37	0	3	2.57	0.87	0.14
Mind map	O3 B	48	0	3	2.04	0.80	0.12
Traditional note-taking	O3 B	37	0	3	1.68	0.75	0.12
Mind map	O4 B	48	1	3	2.12	0.81	0.12
Traditional note-taking	O4 B	37	0	3	1.19	0.91	0.15
Mind map	O5 B	48	0	3	2.48	0.77	0.11
Traditional note-taking	O5 B	37	0	3	2.08	1.26	0.21

Note: n = Total number of observations; Min = Minimum value; Max = Maximum value; M = Arithmetic mean; SD = Standard deviation; SE = Standard error of the mean

Conclusion

Non-linear note-taking has proven to be an effective form of elaborative encoding of religious knowledge, student-friendly and – according to other studies (e.g., Buzan 2001) – potentially a valuable didactic tool from the teacher's perspective as well. Its exceptional effectiveness stems from the fact that content elaboration occurs during the note-taking process itself, which requires active and creative engagement in the lesson. While constructing a mind map, contextual analysis of new information takes place in relation to previously acquired knowledge. Elaborative processing – even of religious content – results in a stronger memory trace. Based on the conducted research, writing non-linear notes can be described as a form of deep elaboration of religious knowledge, fostering the formation of new connections between elements of knowledge and thereby facilitating later recall and retrieval. Moreover, the creation of non-linear notes during the study met the criteria of a memory strategy, enhancing retention of religious knowledge and maximizing cognitive efficiency. The structuring of knowledge that accompanies the process of producing a mind map further serves as a strong factor shaping memory performance, as confirmed by the study. The high degree of content organization in mind maps directly translates into improved recall performance – the so-called structure effect.

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