education sciences

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Podcasts and Informal Learning: Exploring Knowledge Acquisition and Retention

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Abstract: This study explores how podcasts' accessibility fosters learning, examining listener engagement, content preferences, and the unique educational opportunities they offer. With the rise of digital audio platforms, podcasts have emerged as a significant medium for acquiring knowledge outside formal educational settings. Using an online survey, data were collected from 605 respondents, who were predominantly young and well educated, to understand their podcast listening habits and the extent of informal learning. The study categorizes informal learning into self-directed, incidental, and tacit learning. Results show that more than half of respondents engage in self-directed learning, while a third participate in incidental learning, indicating that podcasts serve as effective tools for intentional and unintentional knowledge acquisition. ANOVA analysis reveals that self-directed learners exhibit higher information retention and critical evaluation skills compared to tacit learners. Additionally, trust in podcast content is significantly higher among educated listeners. The study concludes that while podcasts are valuable for learning and professional development, there is a need for enhanced digital literacy to improve critical appraisal skills among listeners. These findings provide insights into the cognitive processes involved in podcast-based learning and suggest practical strategies for educators and content creators to enhance the educational impact of podcasts.

Keywords: informal learning; podcasts; digital education; adult learning; media credibility

Citation: Meden, E.; Radovan, M.; Štefanc, D. Podcasts and Informal Learning: Exploring Knowledge Acquisition and Retention. *Educ. Sci.* **2024**, *14*, 1129. https://doi.org/10.3390/educsci14101129

Academic Editors: José María Fernández-Batanero, Pedro José Arrifano Tadeu and Carlos Jorge Gonçalves Brigas

Received: 9 September 2024
Revised: 7 October 2024
Accepted: 10 October 2024
Published: 17 October 2024

1. Introduction

The landscape of education is rapidly evolving, with informal learning gaining prominence in this digital age. Among the various mediums facilitating this shift, podcasts have established themselves as a powerful tool for education, earning a reputation for educating many listeners [1]. Defined as episodic series of audio broadcasts that can be stored on a device or streamed [2], podcasts have been gaining traction since their inception at the turn of the millennium. The term "podcast", a hybrid of "iPod" and "broadcast", was first coined by Ben Hammersley in 2004 [3], marking the beginning of a new era of digital audio content. Studies have shown that podcasts are increasingly being used for educational purposes. Newman et al. [4] report that a significant proportion of podcast listeners are motivated by the desire to stay informed and acquire knowledge. This trend is especially pronounced in higher and adult education, suggesting that podcasts have a natural place in future teaching approaches. The potential of podcasts as learning tools extends beyond mere content delivery. They foster parasocial relationships [5] and create virtual communities [6], enhancing engagement and promoting diverse perspectives [7]. These aspects contribute to a rich, multifaceted learning experience that aligns with contemporary educational needs. As we navigate the future of learning, understanding the role of podcasts in all kinds of education (formal, non-formal and informal) becomes crucial [8].

2. Literature Review

2.1. The Nature of Informal Learning

According to UNESCO [9], informal learning happens through everyday activities at work, with family, or during free time. It is not planned or structured and usually does not lead to any certification. While it can sometimes be intentional, most of the time it is accidental or random. In a later report, UNESCO [10] discusses different types of informal learning. It distinguishes between purposeful informal learning, which is intentional but not formalized and takes place in everyday contexts such as family time, at work or during community gatherings, and incidental learning, which is unplanned and happens naturally through daily activities. Although incidental learning is not usually included in adult education statistics, it plays a crucial role in lifelong learning. Everyday experiences have a major impact on how people learn, think and develop skills [10].

Jarvis [11] uses the term "informal learning" in lieu of "learning in everyday life". He notes that different forms of learning engage in the same learning process. This implies that there is no distinction between formal, non-formal, and informal learning; rather, the distinction lies in the nature of the interaction that gives rise to the diverse learning experiences.

Schugurensky [12] distinguishes between conscious and unconscious informal learning and adds the dimension of intentionality to his model, naming three types of informal learning: self-directed learning (conscious and intentional), incidental learning (conscious and unintentional), and socialization (unconscious and unintentional). A very similar division is maintained by Rogers [13], and Bennett [14]. Elizabeth Bennett also identifies two processes within integrative learning. She calls them "Knowledge Shifting and Sublimation" and explains them using chemical metaphors. Just as substances move from solid to liquid and gaseous states, and are the same at the level of molecules, so tacit knowledge moves from the unconscious to the conscious and back again through reflection [14].

2.2. Podcasts and Learning

Learning is becoming less and less formal, with people able to choose the time, location, content and manner in which they learn [15]. Podcasts are just one type of online content that many people consume to stay informed and learn. The amount and variety of online content is increasing, and this is having a significant impact on ideas and beliefs related to learning [15]. The rise in the use of digital technology is one of the factors that has also focused researchers' attention on learning processes that are independent of educational programs [13]. In an international study conducted by the Reuters Institute, individuals were questioned regarding their motivations for listening to podcasts [4]. The primary reasons for engaging with podcasts were identified as a desire to remain apprised of developments in areas of interest (46% of responses) and a pursuit of knowledge (39% of responses). Other reasons for listening to podcasts included entertainment, filling free time, and using them as a substitute for music. Nevertheless, respondents exhibited notable differences in their reasons for listening to podcasts, depending on their age [4]. Younger individuals are more likely to listen to podcasts for entertainment purposes, whereas older individuals tend to seek information and knowledge. This is also why it is logical to conceptualize podcasts as a medium for adult learning in andragogy, as they are already intuitively utilized for this purpose.

The "learning power" of podcasts as a learning tool is represented by three characteristics [16]: accessibility, timeliness and adaptability. Podcasts can be easily accessed from many devices, and listening is easy with or without an internet connection. They often address current topical issues that have not been yet presented in books or documentaries. The author sees flexibility in the fact that podcasts are so varied in length and complexity and can be combined with different teaching methods [16].

The field of podcasts in the context of teaching is mainly explored within formal education. Research methods and outcomes vary [17], but typically learners like it when podcasts are included in learning materials. Even in a meta-study on the use of podcasts within the study of medicine [18], the authors found that evidence on the effectiveness

of learning by listening to podcasts was lacking. Some studies showed better results, but these did not change compared to traditional methods. However, the research clearly shows that podcasts are well accepted by students. Students appreciated the accessibility of this type of medium and the possibility of listening to the content repeatedly. Drew [19] refers to podcasts created and used in structured education as institutional educational podcasts and distinguishes them from other educational podcasts that are designed for self-directed learning. In the context of formal, non-formal and informal learning, the latter would encompass informal learning. Drew highlights the fact that educational podcasts have become popular to the extent that they are classified in their own subgroup/genre of podcasts aimed at education, even though they are not created with the intention of being used in structured education [19].

2.3. The Informative Function of Podcasts

Podcasts have become an important source of information and offer a variety of content tailored to different interests and needs. They serve as a bridge between specialized scientific fields and the general public, as demonstrated by their use in disseminating complex topics. By combining specialized content with relatable real-life examples, podcasts can appeal to a broader audience and improve listeners' understanding of specific topics [20]. In the field of political geography, podcasts are known for their ability to influence audience perceptions and engagement with global issues. The innovative method of the "playlist diary" illustrates how podcasts can influence listeners' understanding of geopolitical issues and highlights the importance of placing listener engagement in a specific spatial and temporal context [21]. The marketing potential of podcasts is also noteworthy, with advertisers capitalizing on the popularity of the medium to promote products through the endorsement of podcasters. Factors such as podcast engagement, storytelling and social engagement influence listeners' intention to purchase the recommended products, demonstrating the medium's influence on consumer behavior [22].

However, with the growing influence of podcasts comes the responsibility of developing critical media literacy. As Rubin's [23] study highlights, this is particularly important in the digital age, where misinformation and disinformation are often spread via poorly regulated social media platforms that encourage the spread of misleading content. Media literacy is often proposed as a solution to combat "fake news" by encouraging critical thinking and skepticism among media consumers so that they can distinguish credible information from falsehoods [24]. Overall, podcasts are a valuable source of information from around the world. They offer a unique blend of education, entertainment and marketing potential while requiring careful consideration of content responsibility in the form of media literacy.

2.4. Bridging Companions, Communities and Perspectives

Television, as a medium, can be described as a companion to facilitate daily tasks, but it turns out that podcasts are somewhat better suited to this kind of use. While listening to podcasts, people can often make better use of their time, as they can listen to them while completing tasks that do not require their full attention. Parasocial relationships and interactions with radio hosts have been studied by Quintero and Pantoe-Woodley [5], who found that parasocial networking influences listeners' attitudes towards brands, products and services advertised by radio personalities they like and their use of social networks. When listeners experienced the program as a conversation, an exchange, they listened to the program more often and for longer [5]. While the research focused on consumer behavior related to advertising by popular presenters, listeners also noted that their favorite presenters generally influenced their opinions and views [5], suggesting that parasocial communication in audio media is important if listeners are to be influenced.

The internet offers many opportunities for interaction, including strong virtual communities that form around podcasts. Wrather [6] sees this phenomenon as the result of a combination of the intimacy of radio and the personalization possibilities offered by

modern technology. Typically, podcasts with fewer followers have closer communities, as listeners there play a greater role in the creation of content, and often support the creators financially [6]. McGregor [25] points out that because podcasts are accessible to amateurs, they have proliferated in fan communities, e.g., podcasts about book/TV series.

Podcasts can also be a window into other people's lives. They bring people closer to events that would otherwise not reach them. The author of a study on learning through television [26] argues that interviewees gained a better understanding of cultural and historical events, improved their knowledge of technology and gained insight into political and economic issues as a result of watching television. Patricia Lange [7] highlights that young people's daily online activities, which often expose them to diverse views and prompt reflection on their own assumptions, can lead to incidental learning and a deeper understanding of the individuals portrayed and their lifestyles through encounters with different perspectives.

2.5. Aim of the Study

While podcasts have been extensively studied in formal educational settings, their role in informal learning remains comparatively under-researched [27–29]. The rapid increase in podcast consumption has created new opportunities for informal learning [30–32], but the potential of podcasts to support informal learning and the factors affecting listener perceptions and evaluations of podcast content are less well understood [33]. The present study aims to address this gap by examining several key aspects of informal learning through podcasts. First, it aims to identify and categorize the predominant types of informal learning during podcast consumption. This will examine whether listeners' learning is primarily incidental or self-directed [34]. It also examines what additional learning activities listeners engage in, such as note-taking or further research [35]. Secondly, it will explore how listeners assess the depth and quality of knowledge gained through podcasts [36] and how they select and evaluate the credibility of podcast content [37]. The role of intentionality in podcast-based learning will be examined, comparing purposeful and incidental learning outcomes [38]. Finally, the study will analyze how demographic factors influence various aspects of podcast-based informal learning [39]. By examining these components, this study aims to gain a comprehensive understanding of informal learning using podcasts, contribute to the literature on digital learning modalities [40], and provide information for the development of educational podcasts and their integration into formal educational settings [19].

Research Questions:

RQ1: What is the most prevalent type of informal learning among podcast listeners, and how does this vary across different podcast content categories?
RQ2: What kind of accompanying learning activities do respondents use most often?
RQ3: How do respondents rate the depth of knowledge they gain from listening to podcasts?
RQ4: How does learning intentionality influence respondents' critical evaluation and acceptance of podcast content?
RQ5: How do factors such as age and educational background influence respondents' critical evaluation and acceptance of podcast content?

3. Materials and Methods

3.1. Sample

Table 1 presents a survey sample drawn from a population of podcast listeners who completed an online questionnaire.

Among the valid responses, 297 respondents were female (49.2%) and 307 were male (50.8%). Most respondents were under the age of 45, with only one respondent over the age of 60. The age group with the highest number of respondents was 18–29, comprising 255 individuals (42.2%), followed by the 30–44 age group with 237 respondents (39.2%), and the 45–60 age group with 98 respondents (16.2%). The sample was predominantly highly educated: 14 respondents (2%) had completed primary education, 147 (24%) had completed

secondary education, 284 (47%) had completed post-secondary or higher education, and 159 (26%) held a master's or doctoral degree. We must stress that the overrepresentation of respondents with master's degrees or higher likely reflects the characteristics of the podcast-listening population, not the general Slovenian population.

Table 1. Respondent demographics.

Category	Subcategory	*n*	%
Gender	Female	297	49.2
	Male	307	50.8
Age	18–29	255	42.2
	30–44	237	39.2
	45–60	98	16.2
	Over 60	1	0.2
Education Level	Primary	14	2
	Secondary	147	24
	Post-secondary or Higher	284	47
	Master's or Doctoral	159	26

3.2. Instrument

For the purposes of the survey, we designed an instrument that measured the way people listen to podcasts. The survey comprises 17 questions that delve into respondents' podcast listening habits, potential barriers and difficulties respondents encounter while listening. The most important question for our analysis refers to Rogers' [13] classification of informal learning into self-directed learning, incidental learning, and tacit learning. Respondents who defined their learning as self-directed or incidental were asked to provide examples of what they have learned from podcasts. In the following questions, respondents were asked to indicate what podcasts they usually listen to (Table 2), how often they engage in additional learning activities alongside listening to podcasts (Table 3), the depth of knowledge gained from podcasts (Table 4) and their habits in selecting and critically assessing podcast content (Table 5). The last part of the survey is dedicated to gathering demographic data, including information about the participants' age, gender, and level of education.

Table 2. Types of podcast content (n = 597).

Podcast Content	Responses [1]	% Cases
Politics and Economics	202	34.9
Talk shows	314	54.2
Lifestyle	153	26.4
Society and culture	154	26.6
Science	270	46.6
Popular culture	185	32.0
Sports	157	27.1
Specific Interests (Crime, Tech, etc.)	258	43.2
Total	1693	283.6

Note: [1] the number of responses is not equal to the number of cases (multiple selections allowed).

Table 3. Descriptive statistics on podcast listener engagement (n = 605).

Engagement Activities	Mean [1]	SD
While listening to the podcast, I take notes.	1.35	0.68
I find additional materials on podcast topics.	2.38	0.90
I listen to the podcast twice.	1.82	0.88
I discuss podcasts with friends.	2.81	0.95
I connect and debate online with other listeners.	1.60	0.86
I follow podcast creators on social media.	3.21	1.16

[1] The scale is 1 "Never" up to 5 "Very often".

Table 4. Descriptive statistics on the cognitive impact of podcast listening (n = 605).

Cognitive Effects	Mean [1]	SD
New information from podcasts stays with me.	1.35	0.68
I realize I understand podcast topics only superficially.	2.42	0.74
I notice I forget podcast information.	1.60	0.86
I link new podcast information with prior knowledge.	3.21	1.16

[1] The scale is 1 "Never" up to 5 "Very often".

Table 5. Podcast selection and trust dimensions statistics (n = 605).

Podcast Selection and Trust	Mean [1]	SD
I trust the accuracy of podcast information.	3.96	0.60
I notice when hosts don't reference sources.	3.03	1.13
Podcasts sometimes change my opinion.	2.96	0.66
I choose creators and content I agree with.	3.49	0.91
I select podcasts respected by people I value.	2.53	1.08
I choose podcasts on familiar topics.	3.75	0.92

[1] The scale is 1 "Never" up to 5 "Very often".

The data from Table 2 reveal interesting trends in podcast content preferences. With 1693 responses and multiple selections allowed, talk shows emerge as the most popular category, attracting 54.2% of listeners. Science podcasts follow closely behind at 46.6%, indicating a strong interest in educational content. Specific interests like crime and technology also rank highly at 43.2%. Politics and economics (34.9%) and popular culture (32.0%) show moderate popularity. Interestingly, lifestyle, society and culture, and sports all hover at around 26–27%, suggesting a balanced interest in these topics. The total percentage of 283.6% indicates that respondents, on average, listen to nearly three different types of podcast content, demonstrating diverse listening habits and varied interests in information and entertainment across multiple genres.

The results on podcast listener engagement in Table 3 reveal key insights into how individuals interact with podcast content, based on responses from 605 participants. "I follow podcast creators on social media" emerges as the most common activity, with a mean score of 3.21. This highlights social media as a crucial platform for engaging with podcast audiences. Additionally, "Discussing podcasts with friends" has a mean score of 2.81, showing that podcasts often spark conversations in social circles. Other activities are less common. The least frequent activity is "Taking notes while listening to podcasts", with a mean score of 1.35.

The results in Table 4 on the cognitive effects of podcast listening provide insights into how listeners process and retain information from podcasts. A particularly interesting result is that listeners often find themselves "linking new podcast information with prior knowledge", with this activity receiving the highest mean score of 3.80. Another finding is that "new information from podcasts tends to stay with listeners", indicated by a high mean score of 3.66. This demonstrates that podcasts are a powerful medium for information retention, helping listeners remember new content effectively. Data also highlight some cognitive challenges, e.g., the statement "I realize I understand podcast topics only superficially" has a lower mean score of 2.42. This indicates that some listeners feel their comprehension of podcast topics is not deep, pointing to a potential area for improvement in how podcast content is delivered or engaged with.

Table 5 shows results on podcast selection and trust, and these results show that listeners have a high level of trust in podcast information (M = 3.96) and prefer familiar topics (M = 3.75) as well as content that aligns with their views (M = 3.49). Noticing when hosts do not cite sources is moderately important (M = 3.03), and podcasts have a moderate impact on changing opinions (M = 2.96). Selecting podcasts respected by valued individuals is less significant (M = 2.53).

3.3. Procedure

Data collection was conducted through a concise online questionnaire distributed via popular social media platforms: Facebook, Twitter, and Instagram. The survey invitation was posted on these networks, accompanied by a direct link to the questionnaire. To maximize reach and diversity of respondents, the invitation included an explicit request for participants to share the questionnaire link within their own social networks, leveraging a snowball sampling technique. This approach facilitated broader dissemination and potentially increased the demographic diversity of respondents. The use of social media for distribution allowed for rapid and cost-effective data collection, while also potentially biasing the sample towards more digitally engaged individuals. The questionnaire was published on the web survey application 1KA (https://www.1ka.si/d/en; accessed on 5 October 2024) and was accessible for one week.

4. Results

4.1. Informal Learning Types and Podcast Content (RQ1)

Table 6 shows the distribution of the different types of informal learning among the participants. This table quantifies the prevalence of different forms of informal learning such as self-directed, incidental and tacit learning, and reflects the theoretical distinctions highlighted in the literature.

Table 6. Types of informal learning.

Type of Informal Learning	*n*	%
Self-directed Learning (SDL)	325	53.7
Incidental Learning (IL)	239	39.5
Tacit Learning (TL)	41	6.8
Total	605	100

The results reveal a clear predominance of self-directed learning, with 53.7% of respondents indicating that their podcast listening is deliberate and conscious in nature. Incidental learning emerges as the second most common type, accounting for 39.5% of responses. Notably, only a small fraction of respondents (6.8%) reported tacit learning experiences. A Chi-Square Test for Goodness of Fit was conducted to determine whether the distribution of types of informal learning differed from an expected distribution. The test was statistically significant ($\chi^2 = 210.34$, $p < 0.001$), so these results suggest that the actual distribution of types of informal learning is significantly different from the expected distribution, implying that the preference or occurrence of these types of learning is not equal among the participants.

To further investigate this uneven distribution, Table 7 examines the relationship between these three types of informal learning and the various categories of podcast content consumed.

Table 7. Podcast content and types of informal learning.

Podcast Content	SDL [1]	IL	TL	Total	*n*
Politics and Economics	54.5	39.6	5.9	100.0	202
Talk shows	51.0	42.0	7.0	100.0	304
Lifestyle	58.2	36.6	5.2	100.0	153
Society and culture	63.0	33.8	3.2	100.0	154
Science	62.2	35.6	2.2	100.0	270
Popular culture	52.4	43.2	4.3	100.0	185
Sports	49.7	40.8	9.6	100.0	157
Specific Interests (Crime, Tech, etc.)	62.8	34.9	2.3	100.0	258

[1] SDL = self-directed learning; IL = incidental learning; TL = tacit learning.

Table 7 shows revealing patterns of informal learning in different categories of podcast content. Self-directed learning is consistently the predominant form, with podcasts from the area of society and culture accounting for the highest share at 63%. Incidental learning follows in second place, peaking at 43.2 for podcasts on popular culture. While tacit learning is the least common overall, it shows notable differences, with sports podcasts having the highest share at 9.6%. Science and specialist podcasts show similar patterns, with a high proportion of self-directed learning and a low proportion of tacit learning, suggesting deliberate listener engagement. Political, business and talk show podcasts show a more balanced distribution between incidental and self-directed learning. These results underline the important role that podcasts play in informal education. They illustrate their effectiveness as tools for self-directed learning and, at the same time, show the unique learning dynamics associated with the different podcast genres.

4.2. Accompanying Learning Activities (RQ2)

Table 8 presents a comparison of activities associated with three types of informal learning that can occur while listening to podcasts. The values in the table represent mean scores on a 5-point scale, where 1 is "Never" and 5 is "Very Often".

Table 8. ANOVA summary: informal learning types and learning activities.

Learning Activities	Self-Directed Learning	Incidental Learning	Tacit Learning
Taking notes while listening to the podcast	1.46 ***	1.25 ***	1.00 ***
Seeking additional materials on the podcast topics	2.58 ***	2.24 ***	1.63 ***
Listening to the podcast twice	1.86 *	1.85 *	1.39 *
Discussing podcasts with friends	2.89 ***	2.82 ***	2.17 ***
Engaging with other podcast listeners online	1.62	1.60	1.46
Following podcast creators on social media	3.20	3.26	3.05

Note: *** $p < 0.001$; * $p < 0.05$.

Across all three learning types, "Following podcast creators on social media" has the highest mean scores (3.20, 3.26, and 3.05 for self-directed, incidental, and tacit learning, respectively). In contrast, "Taking notes while listening to the podcast" shows the lowest mean scores across all learning types (1.46, 1.25, and 1.00), with highly significant differences ($p < 0.001$). "Discussing podcasts with friends" emerges as another popular activity, with relatively high mean scores (2.89, 2.82, and 2.17) and significant differences across learning types ($p < 0.001$). "Seeking additional materials on the podcast topics" shows moderate engagement levels, with significant differences across learning types ($p < 0.001$). The highest mean score for this activity is in self-directed learning (2.58). "Listening to the podcast twice" and "Engaging with other podcast listeners online" show lower levels of engagement overall. While repeated listening shows slight but significant differences across learning types ($p < 0.05$), engaging with other listeners online does not exhibit significant differences.

4.3. Depth of Learning with Podcasts (RQ3)

The ANOVA results presented in Table 9 provide insights into the depth of learning associated with three types of informal learning through podcasts. The values represent mean scores on a 5-point scale, where higher scores indicate greater frequency of the learning outcome (1 = Never; 5 = Very often).

Table 9. ANOVA summary: informal learning types and depth.

Depth of Learning	Self-Directed Learning	Incidental Learning	Tacit Learning
Remembering new information from podcasts	3.72 ***	3.63 ***	3.29 ***
Superficially understanding podcast topics	2.41	2.44	2.39
Forgetting information from podcasts	2.77 *	2.84 *	2.41 *
Associating new information with prior knowledge	3.94 ***	3.72 ***	3.15 ***

Note: *** $p < 0.001$; * $p < 0.05$.

One of the most notable findings in Table 9 is that "Associating new information with prior knowledge" shows the highest mean scores for self-directed learning (M = 3.94) and incidental learning (M = 3.72), with a lower but still substantial score for tacit learning (M = 3.15). These differences are highly significant ($p < 0.001$). Similarly, "Remembering new information from podcasts" demonstrates high mean scores across all learning types, with self-directed learning leading (M = 3.72), closely followed by incidental learning (M = 3.63), and then tacit learning (M = 3.29). Again, these differences are highly significant ($p < 0.001$). Interestingly, "Superficially understanding podcast topics" shows relatively low and consistent mean scores across all learning types (2.41, 2.44, and 2.39), with no statistically significant differences. The "Forgetting information from podcasts" category reveals a curious pattern. Incidental learning shows the highest mean score (M = 2.84), followed by self-directed learning (M = 2.77), and then tacit learning (2.41), with significant differences ($p < 0.05$).

4.4. Podcast Selection and Evaluation by Informal Learning Types (RQ4)

Table 10 provides information about differences in content evaluation across three types of informal learning. The values represent mean scores on a 5-point scale, with higher scores indicating a greater frequency of the evaluated behavior.

Table 10. ANOVA summary: informal learning types and content evaluation.

Podcast Selection and Content Evaluation	Self-Directed Learning	Incidental Learning	Tacit Learning
Trusting podcast information	3.96 ***	4.02 ***	3.56 ***
Noticing non-referenced claims	3.19 ***	2.88 ***	2.61 ***
Changing opinions from podcasts	3.02 *	2.91 *	2.83 *
Choosing agreeable creators and content	3.02	3.46	2.83
Choosing podcasts respected by peers	2.54 *	2.60 *	2.10 *
Choosing familiar topic podcasts	3.85 **	3.67 **	3.46 **

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

Analysis revealed a high level of trust in podcast information across all learning types, with incidental learning showing the highest mean score (M = 4.02), closely followed by self-directed learning (M = 3.96), and then tacit learning (M = 3.56). These differences are highly significant ($p < 0.001$). Interestingly, "Noticing non-referenced claims in podcasts" shows a different pattern, with self-directed learners scoring highest (M = 3.19), followed by incidental (M = 2.88) and tacit learners (M = 2.61). These highly significant differences ($p < 0.001$) indicate that more engaged learners are more likely to critically evaluate the sources of information presented in podcasts. The tendency to change opinions based on podcast content shows a slight but significant ($p < 0.05$) difference across learning types, with self-directed learners most likely to report opinion changes (M = 3.02), followed by incidental (M = 2.91) and tacit learners (M = 2.83). "Choosing familiar topic podcasts" demonstrates high mean scores across all learning types, with self-directed learning leading (M = 3.85), followed by incidental (M = 3.67) and tacit learning (M = 3.46). These differences are significant ($p < 0.01$). "Choosing podcasts respected by peers" shows lower overall

scores but significant differences ($p < 0.05$) across learning types, with incidental learners scoring highest (2.60), followed by self-directed (2.54) and tacit learners (2.10).

4.5. Podcast Evaluation across Age and Education Levels (RQ5)

The ANOVA results presented in Table 11 examine differences in trust in podcasts, noticing non-referenced claims, and changing opinions based on age and education level. The analysis reveals several statistically significant findings that warrant attention.

Table 11. ANOVA summary: podcast trust by demographics and affinity.

Category	Trusting Podcast Content	Spotting Uncited Claims	Changing Opinions
Age			
Less than 30 years	3.93	2.90 *	3.01
30 years or more	3.98	3.13 *	2.93
Education Level			
Primary and secondary school	3.82 ***	3.00	2.94
University degree or higher	4.01 ***	3.04	2.97
Podcast Selection by Creator Affinity			
Never/Rarely	3.93	2.99	2.75
Sometimes	3.90	3.09	3.04
Often/Very Often	4.00	3.01	2.97

Note: *** $p < 0.001$; * $p < 0.05$.

When it comes to trusting podcast content, the age group differences are not statistically significant, but a highly significant difference ($p < 0.001$) is observed based on education level, with individuals holding a university degree or higher reporting a mean score of 4.01, compared to 3.82 for those with primary and secondary education. This indicates that higher education is strongly associated with greater trust in podcast information.

Regarding the spotting of uncited claims, a significant difference ($p < 0.05$) exists between the two age groups, where older individuals are more alert when it comes to identifying non-referenced claims. However, no significant differences were found in relation to education level, as both groups reported similar mean scores of around 3.00. Age and education level did not show statistically significant differences in opinion changes.

We also compared these results to participants' selection of creators and content they generally agree with. Podcast selection based on creator affinity does not show significant differences across categories, although those who often or very often select podcasts based on creator affinity tend to trust content slightly more (M = 4.00).

5. Discussion

5.1. Predominance of Self-Directed Learning

The results related to RQ1 reveal a clear predominance of self-directed learning, with 53.7% of respondents indicating that their podcast listening is deliberate and conscious in nature. This suggests that most podcast listeners approach this medium with intentional learning goals, actively seeking out content to expand their knowledge or skills. This aligns with research by Hew [33] and Gielissen and Chan [41], which suggests that podcasts serve as a valuable resource for lifelong learning and professional development. Incidental learning emerges as the second most common type, accounting for 39.5% of responses. This substantial proportion indicates that many listeners, while not primarily focused on learning, are nonetheless aware of the educational benefits they gain from podcast content. These individuals may be listening for entertainment or other purposes but recognize the unintended learning outcomes that occur during the process. This supports the idea that podcasts can blend entertainment with education, a concept that is also supported by Gielissen and Chan [41], who emphasized the dual-purpose nature of podcasts. Only a small fraction of respondents (6.8%) reported tacit learning experiences. This low percentage suggests that very few podcast listeners engage with the medium without any conscious

awareness of learning taking place. It is important to consider that this group may still be acquiring knowledge or skills, but in an entirely unintentional and unconscious manner.

We also compared the types of informal learning in different categories of podcast content. Key findings show that while tacit learning is the least common overall, it is most common in sports podcasts. Science and specialist podcasts show a high proportion of self-directed learning and a low proportion of tacit learning, suggesting deliberate engagement by listeners. In contrast, political, business and talk show podcasts show a more balanced distribution between incidental and self-directed learning. These results illustrate the different roles that podcasts play in informal learning. They show their effectiveness as tools for self-directed learning and, at the same time, reveal different learning patterns associated with different podcast genres. These results are in line with the conclusions of Rehman et al. [20] that podcasts can be effective tools for informal learning, especially in specialized scientific fields such as medicine. Our findings suggest that the type of podcast content has a significant impact on the nature of learning.

5.2. Accompanying Learning Activities

Regarding RQ2, the results show that respondents rarely use accompanying learning activities when listening. The most popular are following podcast creators on social networks, talking to friends and searching for additional materials (e.g., videos, books, etc.). Data on the relatively low use of additional materials and learning activities when learning from podcasts reflect the findings in the field on the nature of the podcast as an educational medium. When podcasts are included in formal education, they play the role of a supplement [19], whereas in informal learning they play the central role of bringing content to learners, and everything else (such as interesting links) becomes extra learning material. Social activities related to listening to podcasts, such as discussing with friends or an online community and following the creators, are not encouraged by the user interfaces of podcast apps [42]. Direct options to comment and connect with other listeners are mostly absent. The social aspect is limited to sharing content with other isolated listeners via social networks.

5.3. Depth of Learning and Retention

In answering RQ3, the ANOVA shows a nuanced relationship between the informal learning types and the depth of learning achieved by the podcast listeners. The results indicate that self-directed learning leads to the highest level of information retention, followed by incidental learning and then tacit learning. Self-directed learning, which is characterized by proactive knowledge acquisition, leads to deeper understanding and long-term retention. This is due to learners engaging in critical analysis, relating new information to existing knowledge and developing a problem-solving framework [43]. Incidental learning, occurring without conscious effort, generally leads to less depth than intentional learning. However, it can still be substantial. A study on the lexical demands of podcasts found that 60% of word families from the 2000-word level were encountered frequently, suggesting potential for incidental vocabulary learning [44]. Intentional learning, as seen in higher education podcast use, can lead to deeper understanding and retention. Medical students using educational podcasts reported spending more time studying and found these podcasts helpful for reinforcing their knowledge, although their exam scores did not differ significantly from those of non-users [45]. Similarly, podcast use as a non-formal learning tool in higher education increased students' reflective skills and learning motivation [46]. In conclusion, while incidental learning from podcasts can be beneficial, intentional engagement typically results in deeper and more comprehensive understanding of the material.

5.4. Trust and Credibility of Podcast Content

RQ4 analysis revealed a high level of confidence in podcast information across all learning types, with incidental learning having the highest average score, closely followed

by self-directed learning and then tacit learning. The results suggest that while podcast listeners generally trust the information they receive, those engaged in more active forms of learning (incidental and self-directed) tend to place even greater trust in the content. Research indicates that podcasts are perceived as highly credible sources of information. A study on food, agricultural, natural resources, and human science (FANRHS) podcasts found that listeners have moderate to moderately high levels of trust in the information presented. This trust is influenced by the credibility of the podcast producers and guests, as well as the thoroughness of the content [47]. The study suggests that trust can be enhanced by using specific communication tactics and framing strategies to build relationships with listeners. Another study on the credibility of podcast media found that podcasts are perceived as highly credible due to the non-anonymous nature of presenters and the in-depth research that supports the content. This credibility helps stimulate listeners' minds, making podcasts reliable sources of information [48]. The tendency to change opinions based on podcast content shows a slight but significant difference across learning types, with self-directed learners most likely to report opinion changes compared to other learners. This suggests that more active engagement with podcast content may lead to greater openness to new perspectives. This result aligns with Lange's [7] statement that exposure to different viewpoints offered by online technologies encourages individuals to reflect on their own assumptions and interpretations of the world. To some extent, this result contradicts MacDougall's [49] criticism, which claims that listening to podcasts is merely a ritual that reinforces an individual's worldview. Somewhat more consistent with his views on "staying within a narrow familiar field" is the finding that most respondents choose podcast topics and creators they are familiar with, rather than selecting them based on what others are listening to.

5.5. Impact of Demographic and Creator Affinity Factors on Content Evaluation

RQ5 deals with the relationship between the demographic characteristics of podcast listeners and their critical evaluation of the content. Our results indicate that trust in podcast information is significantly influenced by education level, with higher trust observed among those with university degrees. This result is somewhat surprising and does not meet our expectations. One would think that adults with higher levels of education would be more skeptical of the information they hear, as many studies show that higher levels of education are associated with better online skills and the ability to evaluate digital content more critically [50,51]. In our study, we observe the opposite results. One possible explanation is that highly educated individuals are more likely to seek out podcasts that align with their areas of expertise or interest. Consequently, they might trust these seemingly specialized sources more, thus seeing less need to review them [52]. On the other hand, we can observe the growing skepticism and distrust of mainstream media all over the world in recent years. Studies suggest that people with lower levels of education have less trust in news from social media and digital platforms, while people with higher levels of education are skeptical of mainstream media but have more trust in online news [53].

Age seems to play a role in the ability to notice unreferenced statements, with older individuals being more attentive. The results of our study suggest that listeners' age has an impact on their propensity to check the sources of podcast content. Older listeners showed a stronger propensity to source check than their younger counterparts. This observation may be consistent with the idea that with increasing maturity comes an increased need for knowledge and skepticism, possibly rooted in accumulated life experiences [54]. As people age, they tend to develop a more critical mindset and become more aware of the potential for misinformation or biased content, leading them to actively investigate and scrutinize the sources of information presented in podcasts.

Interestingly, although podcast selection based on creator affinity did not significantly vary across categories, higher trust levels were slightly associated with more frequent use of this selection method.

6. Conclusions

Our study provides valuable insights into the nature of informal learning through podcasts and its impact on education and information consumption in the digital age. The results show that podcasts are a powerful medium for self-directed and incidental learning, with listeners actively engaging in knowledge acquisition and retention. The high level of trust placed in podcast content, particularly among educated and older listeners, highlights both the potential and challenges of this medium as an educational resource. The prevalence of self-directed learning in podcast consumption underlines the medium's ability to support lifelong learning and professional development. However, the limited use of accompanying learning activities and the high reliance on podcast information across all learner types suggest that listeners need to improve their critical appraisal skills.

6.1. Future Research

These findings have significant implications for both future research and the practical application of podcasts as learning resources. Future studies should look more closely at the cognitive processes underlying different types of podcast-based learning. This could perhaps involve the use of neuroimaging techniques to understand how information is processed and retained. In addition, research could investigate the long-term effects of podcast learning on knowledge retention and skill development in different domains. From a practical perspective, educators and podcast creators should develop strategies that encourage more active engagement with the content, such as incorporating interactive elements or prompts for reflection. The results of this study can be generalized across all podcast types and listener intentions. Future research should involve more detailed examination of how learning purpose varies by podcast topic and listener intent, potentially impacting other outcomes, and consider analyzing results based on specific podcast categories (e.g., science, news, entertainment, self-help) and listener goals to gain more nuanced insights. Furthermore, as our study focused exclusively on audio podcasts, future investigations should examine how these results relate to video podcasts, where visual elements may interact with auditory information to affect learning outcomes and strategy effectiveness.

6.2. Study Limitations

A key limitation of this study is the potential bias in our sample, which may not be fully representative of the broader podcast-listening population. Our data collection method, utilizing social media platforms for survey distribution, likely resulted in an overrepresentation of digitally engaged individuals and those with higher education levels. For instance, the high proportion of respondents with master's degrees or higher suggests a skew towards a more educated demographic. However, it is important to note that the characteristics of a truly representative sample of podcast listeners remain unclear, as comprehensive demographic data on this population are limited. While our sample provides valuable insights, particularly into the habits of more educated and digitally active podcast consumers, caution should be exercised with regard to generalizing these findings to all podcast listeners. Future research should aim to develop more robust sampling methods to capture a wider range of podcast listener demographics and behaviors. Another limitation of this study is the lack of detailed analysis on how different types of podcasts influence learning outcomes and listener attitudes. While our research provides a broad overview of informal learning through podcasts, it does not differentiate between the varied content categories such as news, entertainment, educational, or special interest podcasts. Each of these genres may have distinct impacts on learning processes, knowledge retention, and listener engagement. Furthermore, listener intentions and motivations for choosing specific podcast types were not extensively explored, which could significantly affect learning outcomes and trust in the content. Future research should aim to conduct a more granular analysis, examining how podcast genres, content characteristics, and listener motivations interact to influence learning results and attitudes toward the medium. Such detailed investigation could provide more nuanced insights into the effectiveness of

podcasts as an informal learning tool across various contexts and subject matters. Lastly, as we distributed survey links through social media platforms and encouraged participants to invite others, our sampling was not random. Consequently, our sample may not be representative of the broader Slovenian population, limiting the generalizability of our findings to the wider podcast-listening demographic.

While podcasts offer immense potential as informal learning tools, fully realizing this potential will require a combined effort from creators, educators and listeners alike. By encouraging critical thinking and active engagement with podcast content, we can realize the full educational potential of this increasingly popular medium.

Author Contributions: Conceptualization, E.M. and M.R.; methodology, E.M., M.R. and D.Š.; formal analysis, M.R. and D.Š.; investigation, E.M.; writing—original draft preparation, E.M.; writing—review and editing, E.M., M.R. and D.Š.; supervision, M.R. and D.Š. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the Slovenian Research and Innovation Agency, grant number P5-0174 "Pedagogical-Andragogical Research—Learning and Education for Quality Community Life".

Institutional Review Board Statement: The study did not require ethical approval as it was conducted entirely online using an anonymous survey platform. Participants were provided with a clear explanation of the study's purpose and their rights on the front page of the online survey. Their voluntary completion of the survey was considered implicit consent to participate. However, as researchers, we are committed to upholding the highest ethical standards in our work. All data collected remains confidential and will be used solely for the purposes outlined in the study information provided to participants.

Informed Consent Statement: Not applicable.

Data Availability Statement: The authors will make the raw data supporting this article's conclusions available upon request.

Conflicts of Interest: The authors declare no conflicts of interest.

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