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New trends in management
New trends in education

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Dear "e-mentor" readers,

I am delighted to share with you the newest collection of papers. The topics discussed in this issue reflect very well the trends in the current public debates on how to cope with challenges induced by technological revolution.

New trends in management concern mostly the applications of artificial intelligence in business and in the decision-making process in particular. However, it is not only about AI, but also about the possibilities of involving the *crowd* in open innovation processes.

Readers primarily interested in new trends in education can learn about a new tool to assist teachers in designing online interactive content based on experiences from Poland, Italy, Bulgaria, Greece and Sweden. They can also investigate the problem of compatibility between vocational personalities and career interests of university students based on the results of research conducted in Pakistan. Two other articles touch upon practical problems of criteria for selecting preferred and avoided partners for teamwork in the classroom and guidelines for preparing a successful Erasmus+ proposal. Finally, readers can reflect on the economic education of people with disabilities serving as a tool supporting social inclusion.

What this issue also illustrates well are the achievements in the project of internationalisation supported for the last two years by the Ministry of Science and Higher Education (Poland) (RCN/SP/0361/2021/1). We have accomplished various tasks focused on enhancing the recognition of "e-mentor" in the international academic community, such as cooperation with the foreign organisers of scientific conferences or translating Polish articles into English. Our efforts have resulted in a growing number of authors and reviewers affiliated to foreign institutions. Additionally, we kindly invite you to visit our new website. I sincerely hope that the improvements will satisfy not only our readers, but also authors and reviewers. At the same time, I would like to cordially invite you to contribute to "e-mentor".

"E-mentor" is an open-access journal available free of charge, both online and in printed form. All scientific papers are peer-reviewed and we provide free proofreading of papers accepted for publication in our English issues. Every article gets an individual DOI registered in Crossref, and the journal is indexed in several global databases, including Web of Science ESCI and EBSCO. There is **no publishing fee for the authors**. Further details are available online at http://www.e-mentor.edu.pl/eng/page/8/Info_for_Authors. Should you have any questions concerning publications in "e-mentor", please contact the editorial team at redakcja@e-mentor.edu.pl.

Małgorzata Marchewka
Editor

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Agnieszka Konieczna

Criteria for selecting preferred and avoided partners for teamwork in the classroom and their contextual variability: an adolescent perspective

Abstract

In real life, people do not always choose who they work with and the size of the working group. However, when placed in a group or pair, they do not always function successfully as a team. This paper reveals the preferences and criteria for selecting group work partners from the perspective of 7th and 8th grade students, attempting to capture behaviours perceived as critical to the development of trust (trustworthiness). In addition, the attributes of the preferred and avoided partner were compared in a wide range of team situations in classrooms (team task, a sports game, sharing a desk, peer tutoring). It was found that while friendship commitments are a factor in the selection of peers for a joint task, the matching criteria and expectations of partners change depending on the requirements of the task itself. These findings should be relevant to researchers and educators who are looking for an optimal classroom seating arrangement or team formation method to promote learning based on a group format that students find rewarding and valuable.

Keywords: teamwork management, team formation methods, dysfunctional work groups, reliability of cooperation partner, social choices

Introduction

Group work is widely incorporated into education programmes at all levels because of the supposed numerous potential cognitive, social, and motivational benefits of promoting productive peer interaction and collaboration (e.g., Kamińska, 2021; Shimazoe & Aldrich, 2010). According to the constructivist assumption that knowledge is co-created socially, this educational format of working in small groups uniquely provides opportunities for social comparisons and social learning (Bandura, 2000). Students can gain significantly through the process of negotiation and consensus-building with peers, which is an integral part of the experience of social interdependence (Johnson & Johnson, 2009). Some researchers even suggest that group work is an element of the developing of democracy and citizenship, as it not only equips young people with skills that are valuable in the job market, but also allows them to explore what makes them desirable members of a group (Rees, 2009).

While literature confirms the associated benefits of the group work format for students at various levels of performance, other findings indicate that students and teachers report numerous challenges and barriers to implementing group work and frustrations with dysfunctional groups (e.g., Chiriac & Granström, 2012; Krawczyk-Bryłka & Nowicki, 2020; Rees, 2009).

However, differences were also discovered between teachers and students in their perceptions of key issues related to group work (Chiriac & Granström, 2012). Accordingly, researchers suggest using a participatory process to evaluate various aspects of group work (Florez & McCaslin, 2008; Fredrick, 2008; Kanevsky et al., 2022; Rees, 2009). The researchers emphasise that students must be free to express their concerns, the encountered problems, opinions, and complaints about various types of group dysfunctionality during teamwork (Shimazoe & Aldrich, 2010). At the same time, they point out that examining students' preferences for selecting peers for small teams can

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provide insight into critical features of group work and students' perceived barriers to effective group participation (Neu, 2018; Rees, 2009).

This work shows the preferences and criteria for selection of groups from the perspective of 7th and 8th grade students. The focus was on students' qualitative accounts of reasons for inclusion in and exclusion from groups, characteristics required for group participation, and priorities and perceived barriers to valued group membership.

Group assignment methods

Group work requires identifying group participants and choosing the size of the group (Chapman et al., 2006; Kamińska, 2021). The question of who should form the team and how peers should be matched into pairs or groups is an important practical issue facing teachers (Ciani et al., 2008). At the same time, it has been a highly controversial and divisive issue for many years (e.g., Matta et al., 2011).

There are three well-established ways of forming teams described in literature: (1) random selection, (2) (independent) student selection, and (3) instructor's selection (e.g., Neu, 2018). Importantly, each has advantages and disadvantages (Matta et al., 2011). "Random" selection is very easy and quick to implement, and in addition it excludes potential negotiations and gives all teams an equal chance of success or failure. However, it can lead to unintended consequences, such as inequality in academic skills between teams, and lack of diversity within teams (Blowers, 2003). "Self-selection" allows students to decide on their team members and form teams based on friendships or knowledge of their strengths and weaknesses. However, this often leads to teams that are homogeneous in terms of skills, specialisation, gender or ethnicity (Chapman et al., 2006). In contrast, assigning students to groups ("instructor's selection") makes it possible to create heterogeneous and balanced teams according to predetermined criteria (Chen & Gong, 2018). However, collecting data on students to identify personality type, strengths, and learning styles has proven to be time-consuming and complicated, and therefore it has proven easier to create teams formed based on academic performance, and this is more common (Matta et al., 2011).

While it is not obvious which method of forming effective teams is better, various experiences and evidence supporting specific selection options can be found in literature (e.g., Chapman et al., 2006; Matta et al., 2011). The results of the study suggest that heterogeneous groups assigned by teachers are more productive and more task-oriented compared to groups that chose their members themselves. There is also evidence in favour of self-selection as a method of team formation, as teams formed by students score more highly (as measured by higher final grades) than teams formed by teachers (Chen & Gong, 2018; Rusticus & Justus, 2019). In addition, in self-selected groups, students reported greater input from team members, greater satisfaction with the team experience and with the team, satisfaction with the group's overall performance, higher levels of commitment, and trust and relationship satisfaction (Chapman et al., 2006; Hilton & Phillips, 2010; Myers, 2012).

Therefore, some researchers, highlighting the strengths as well as the weaknesses of team formation methods, suggest that hybrid approaches that combine students' preferences for group composition with some degree of teacher control may be a better way of promoting student achievement and satisfaction (Matta et al., 2011). However, there are still no determinations as to how to help students regain comfort or overcome the many different types of group dysfunctionality.

Students' preferences regarding the method of group formation and composition

From the students' perspective, connecting with partners they did not choose is a challenge to comfortable and satisfying teamwork (Hilton & Phillips, 2010; Myers, 2012; Rusticus & Justus, 2019). More students prefer to work when more autonomy is provided and when they have the opportunity to choose their group members (Chapman et al., 2006; Koutrouba et al., 2012; Rees, 2009).

Given a choice, students prefer to work with their friends, with whom they feel more comfortable (Chapman et al., 2006; Hilton & Phillips, 2010; Konieczna, 2020; Koutrouba et al., 2012; Neu, 2018). It has also been shown that the opportunity to work with friends is one of the reasons why students prefer and enjoy working in a group more than working alone (Myers, 2012). Students also pointed out the risk of including partners in their teams without access to knowledge about whether they can be effective partners (Rusticus & Justus, 2019).

In addition, evidence has been gathered that shows that most students preferred working in a group to working alone, if it was with the "right" colleagues (Kanevsky et al., 2022). Students preferred to work independently rather than as part of a team if members did not contribute equally, did not work at the same pace as them, or collaboration could result in potential conflict or a poor grade (Kanevsky et al., 2022). If safe, supportive and equitable collaborative conditions were not available, students preferred to work alone, showing that it is desirable for them to choose partners based on weighing risks and benefits (Koutrouba et al., 2012).

Perceived credibility of the cooperation partner

A positive expectation that others will perform certain actions that are important to the success of the team, or at least act in a benign manner, are critical elements that define trust (Breuer et al., 2020; Costa,

2003; Mayer et al., 1995). Violations of trust expectations mean that team members may not achieve the grade to which they aspire or are forced to devote more time and effort to make up for a team member's poor performance (Neu, 2018). Disappointment may influence team members' decisions to continue working with their current team or, in cases of low trust, to attempt to leave the team (Breuer et al., 2020).

The results indicate that classmates who have proven to be reliable in the past are considered more trustworthy (Neu, 2018). Thus, at the core of trust is knowledge of the trustworthiness of the person in question, which develops from the perception and direct experience of team members (Breuer et al., 2020). This knowledge develops over time, as students interact and learn about each other. Mayer et al. (1995) explain that trustworthiness is related to beliefs about the qualities of the person in question, as trustworthiness is defined as a belief in the person's abilities, benevolence and honesty (Breuer et al., 2020; Costa, 2003).

Research suggests that people use available cues or direct information to assess reliability. For example, they observe how assessed team members share information, and whether they discuss conflicts within the team or form coalitions (Breuer et al., 2020). However, judgments, trust, and decisions are not always rational, based on first-hand knowledge of the other party, insights or cool reasoning (Neu, 2018). Trust is clearly shaped by various heuristics and emotional feelings, especially when emotional ties and concern for the well-being of partners become the basis of trust. Trust can come from group membership, reputation, and stereotypes. Therefore, trust is sometimes very easy to develop and other times almost impossible to develop, maintain or repair (Breuer et al., 2020).

The current study

The theoretical frameworks of social interdependence (Johnson & Johnson, 2009) and social learning (Bandura, 2000) suggest that students learn a great deal from overcoming peer conflicts and difficult situations. At the same time, the inherent social dimension of group work makes the formation of small groups a highly stressful situation, especially since the creation of a dysfunctional team can lead to escalating conflicts, hostility among group members, unfair work distribution, and deactivation of other members, formation of cliques, or group disintegration (e.g., Chapman et al., 2006; Konieczna, 2020; Krawczyk-Bryłka & Nowicki, 2020; Rusticus & Justus, 2019).

Researchers have long sought to discover which key social behaviours influence comfort in groups and are perceived as beneficial (Neu, 2018; Rees, 2009). However, studies on teamwork in the upper elementary school years are scarce (Ladd et al., 2014). Insights from students at this age may be unique, because teenage students, more than younger and older students, might focus on relational aspects rather than task outcomes (Chapman et al., 2006; Kanevsky et al., 2022; Konieczna, 2020; Matta et al., 2011; Myers, 2012). Insights from these 14-15-year-old students on the reasons for inclusion and exclusion from groups, traits required for group participation, and priorities and perceived barriers to valued group membership can provide valuable information for developing appropriate interventions for this population.

Furthermore, previous research focusing on the development of tools to measure team effectiveness suggests that different behaviours contributing to a team's success correspond to different types of teams (Breuer et al., 2020). The attractiveness of collaboration versus preferences for individual work has been found to depend on the nature of the task (Kanevsky et al., 2022). Thus, the factors critical for the effective functioning of a project team may differ from those for a sports team. However, there is currently no information available on this topic. Focussing on specific types of tasks when investigating students' preferences for selecting peers for teams can provide additional insight into critical features of group work and students' perceived contextual barriers to effective group participation.

Methods

Participants

The participants were students from the last years of elementary school. The study involved 15 women and 15 men, aged 13 to 15, who were students of public schools located in an agglomeration in the central part of the country. The 7th-grade participants were all from the same school and class, while the 8th-grade participants attended two different schools, with each school represented by a single class.

Data collection

Individual semi-structured interviews were conducted. In the first stage, participants classified their classmates according to the principles of sociometric technique. A simple peer nomination technique (Zwierzyńska, 2008) was used to categorise class members. Participants sequentially filled out four separate diagrams according to the four categories of cooperative situations: "teamwork," "sports game," "sharing a desk," and "peer tutoring". The instructions were that participants should classify their classmates by filling in concentric circles on the diagrams. The assistants stipulated that the class members listed in these circles be called using nicknames or by a symbol.

The assistants instructed participants to place in the innermost circle classmates they would be "very happy" to select as cooperation partners and classmates they would be "less happy" to select as cooperation partners in the next circle; in the outer circle, they were instructed to place classmates they would "prefer not" to select as cooperation partners, given the opportunity to choose the team members themselves. The assistants pointed out that the circles could be empty, full or anywhere in between, and the

placement could be amended. Placement in circles 1, 2 or 3 served as an indication of the degree of avoidance or preference for a particular partner.

After completing each diagram, a brief conversation was held, during which participants gave subjective reasons for their choices. As each diagram contained all classmates distributed across three circles, the participants commented on their placement within each circle. The purpose of the interview was to gather rich responses on the matching criteria based on which students select peers for a joint task. In total, 30 participants provided information on their perceptions of classmates within their class group, resulting in over 650 descriptions of class members as potential partners for cooperation, considering classes of approximately 20 students each. Across the four types of collaborative situations, this yielded over 2500 comments regarding characteristics of peers identified as highly preferred, less preferred, or avoided.

All interviews were held in a closed room to ensure participants confidentiality, and lasted about 30 minutes. They were conducted by trained research assistants. All participants were asked a basic set of questions which were adjusted as necessary. The interviews were conducted in Polish. All interviews were recorded in audio format with the permission of the participants and transcribed verbatim. Anonymous citations are linked to gender (e.g., F), class (e.g., 7).

Ethical considerations

The guidelines of the principles of the Declaration of Helsinki were followed, with respect for the interests of adolescents. The testing process was explained to the participants verbally. Written informed consent was required from parents and informed consent was required from the participants before participation (including consent for recording interviews).

Data analysis

Qualitative analysis was based on the principles of thematic analysis (Braun & Clarke, 2006). The procedure was as follows. First, the transcriptions and data on the diagrams were read several times to familiarise oneself with the data and gain a sense of the overall picture. Next, initial codes were created and grouped thematically, allocated to criteria for selecting preferred versus less preferred and avoided partners in each type of collaboration. Through continuous comparison, independent categories were condensed into distinct themes, and codes were assigned to transcript segments based on emerging themes. Topics were reviewed for coded excerpts and the entire dataset and were refined. Based on repeated reading, reviewing and interpreting students' comments, recurring patterns were established. Statements that best reflected the topics were used as illustrative quotes.

Credibility and validity of the analysis

To render the data more reliable, the three interviews were analysed independently by the researcher and a research assistant. All discrepancies were discussed and modified several times through discussions until a consensus was reached. The final topics and interpretations were presented and confirmed through discussion with a team of two experts who were active teachers working daily with students from grades 7 and 8, to prevent bias.

In this way, experts provided feedback and confirmed that the results reflected their experiences.

Results: Partner preferred and avoided: selection criteria in selected areas of cooperation

This analysis focuses on students' statements concerning their preferences and experiences in selecting partners for four types of collaborative activities. These will be discussed separately.

Desk partner

Participants report trying to find a balance between learning efficiency and enjoying learning with a partner. They prefer partners who will facilitate the best results and at the same time want to feel comfortable working with them. They are most likely to choose those peers with whom they feel close and can talk freely in class. They have interesting topics to talk about in class with them and are not bored in their company.

While participants point out that social activities make learning together more fun, it is important that desk partners are able to work together and not disturb each other during lessons when they have something to do. Preferred as partners, therefore, are colleagues who initiate social chit-chat, "but when you have to be quiet, they let you focus" (M, 8). Desirable partners usually do not cause undue disruption. On the other hand, partners who constantly talk or cause a distraction, and hinder benefiting from the lesson, are less preferred: "I think she would talk to me a lot and we would just do less in the lesson and I would get little out of the lesson" (F, 8). With that said, a complete lack of social interaction in the classroom is also undesirable. Quiet people and loners are the least preferred partners.

Respondents reported that they appreciated cooperative people and preferred working together. Particularly valued is the willingness to share solutions or materials, exchange notes, give hints on a test, and provide help in understanding the material if needed, as one respondent points out in her extensive statement:

> I know that Julka would always help me, in a test, during a task, she would always give me a hint if I had a problem, or I could copy something from her. I could count on her to explain to me how to solve a problem, to talk about some task in mathematics, for example. I can ask her if we have the same results, or we can do it faster together. (F, 8)

In general, participants consider parasitism (using someone else's work without contributing) to be unfair and expect partners to work together in a mutually beneficial way, as highlighted by several statements: "I think that if we were to do some small things, he would just demand more from me than from himself" (M, 7); "he wouldn't do anything himself and would copy everything from me" (F, 8). Partners who violate the principle of fairness and sharing (they want to copy someone's work), and in addition do not respect the principle of focusing on work, are the source of the greatest frustration. Many respondents do not hide their irritation: "I used to sit with [him] and he annoyed me terribly, because he kept asking for something, kept wanting something from me"; "that's the worst thing, that he doesn't want to ask me, he just wants to copy from me. He won't ask why it worked out that way, he just wants to write it down"; "[he] plays jokes on me, and I just sometimes need to focus on the task at hand, rather than him talking to me about some nonsense" (F, 8).

An avoidant partner can also contribute to conflicts when he or she does not respect personal space, one statement explained:

> I sat down with him at maths just once; he took my pencil case and started rummaging through it, and that irritated me. Also, when I was doing a task and concentrating, he started poking me, started asking me about something, tried to talk to me. (F, 8)

In addition, participants indicated that they try to avoid partners who may need constant supervision and help in solving tasks: "I would have to constantly watch him do tasks" (F, 7).

Teamwork during classes

Participants reported that group work with friends guaranteed them comfortable communication, reliability and a positive atmosphere. Repeated arguments include "it's easy to decide who does what," "we're in sync," "it's always fun." One respondent emphatically suggests that valuable partnerships are based on relationships of friendship and affection:

> If I had to work with people outside my group, it would definitely be harder for me and I would find it less enjoyable, because it would already be like more tiring work, rather than team-building with people from my group. I would have to force myself. (F, 8)

Participants' statements indicate that agreeableness and the ability to create harmonious interactions are highly valued: "We wouldn't have any of those kinds of spats and problems" (M, 8); "they're the kind of people that I just get along with and I know that I can do this with them, I know that I won't argue with them" (F, 7); "he's such an amicable person, so it's easy to get along with him that «okay, I'll do this and you do that»" (F, 8). Many value humour in their partners and their ability to provide a comfortable working atmosphere: "he always jokes around when we're in a group with him" (M, 8); "he always adds such laughter, is easy-going, and it's fun, and even if he doesn't do too much, at least it's funny" (F, 8).

Many of the statements were about being dutiful and committed to work. A desirable partner "always knows what to do"; he always has input, "and it's not like one is doing something and the other sits around and does nothing" (F, 8). Among colleagues less likely to be chosen were those judged to do little, deliberately avoid work, or do things unrelated to the group task, and who need to be told specifically what to do and how to do it. Although they ultimately do the work, it requires investment from other members in the form of managing their efforts, monitoring, and giving additional instructions, and this slows down the work. The performance of such partners is perceived as incomplete:

> [he] does very little and he doesn't feel like doing much. He's the kind of person that doesn't quite know what to do. If I don't point it out to him, he won't figure it out by himself. But if he's told to, well, he'll start doing something. (F, 8)

"[he] likes to add a lot of meaningless stuff that's not connected with the work we're supposed to do" (M, 7).

Participants expect their partners to be responsible, to contribute fairly: "he thinks that the group will do everything and it will be fine" (F, 8); "well he just sits and does nothing. He doesn't do anything, he usually just gets in the way" (F, 8). Lack of commitment is a common argument against working with someone:

> She doesn't always [take] these things seriously, because she thinks that the other person will do more and that she will get a grade just like the other person, even though she did very little. I would prefer not to work with her. (F, 8)

Sports games

While athletic ability is important for students, a combination of skills, including sportsmanship, cooperation during the game and the ability to self-regulate, has proven to be important when selecting playing partners. Participants appreciate partners who are involved in the game, behave cooperatively, and don't break the rules of the game: "[she] wouldn't coast, so it wouldn't be a problem" (F, 7); "when played, she was also so involved, she complies with the rules of the sport, it's fun to work as a team" (M, 8); "he often doesn't feel like doing something, but once he gets into a sport, it's great fun to be with him in a team" (M, 8).

Participants reported being troubled by partners who, although they have athletic abilities that are

useful in the context of a group task, "don't understand" what it means to "play as a team". They are particularly annoyed and repelled by dominators, with whom they play poorly through their bossy behaviour, favouritism or "seizing" the game: "[she] plays by herself, thinks she is the only one and is terribly bossy"; "[he] is so often not very team-oriented"; "[they] are convinced that they are the best at everything"; "she likes to lead" (F, 8). Participants often describe how, in key game situations on the field, colleagues ignore the other players and don't pass the ball to others: "terribly annoying, he prefers to play by himself the most, he puts more on himself" (F, 7).

Participants also say they do not want to play with a colleague who is disruptive and does not invest effort, as highlighted by one statement, "he's fooling around, standing around, doing nothing, or walking around, talking to someone" (F, 8). They emphasise the inadequacy of such behaviour when a partner is expected to engage in the game: "we can fool around, but when we play, we need to focus on what we are doing" (M, 8).

Participants report that they value balanced players capable of dealing with difficulties. Therefore, classmates who do not control their emotions and aggressive behaviour, e.g., complain, often take offence, give up easily, get angry, are indicated as less likely to be chosen and are often described as being childish: "whenever something doesn't work out for him, he gets upset quickly, and then blames the rest of the group for the failure" (F, 7); "when there is no one good on the team, he sits down on the bench upset and says he won't play anymore, saying they will surely lose, that's the kind of trouble he often causes" (M, 8). Another respondent emphasises unpredictability: "he often gets angry, and I'd rather not have him on the team, because that's the kind of person that gets angry simply during sports, and such fury erupts in him, and he goes away somewhere" (M, 8).

Peer tutoring

The informal after-school meetings referred to in this work as *peer tutoring* function as a form of learning in which one student helps another understand and master the material. This could be catching up on work, helping with homework, or preparing for a test together.

Respondents emphasise that they trust partners who demonstrate a high level of skill in the field in which they tutor. If the "tutor" is competent and knows the material well, he is a reliable source of knowledge. One participant says, "I could ask him to explain some sections of maths to me, because I just noticed that these sections come easily to him" (M, 7). A person without the right knowledge cannot help effectively with learning: "I wouldn't count on much here, because he's not interested in education" (F, 8). However, only a communicative person is rated as helpful: "She's pretty good at maths, although she doesn't know how to explain it" (M, 8); "I don't know if she would help me. She gives me her assignments to copy, but whether she would explain anything to me is doubtful. He's a total bear and it would be hard to get anything out of him" (M, 8). A kind-hearted person is also preferred: "[he] is eager to help, and he doesn't need to be specially persuaded to do so" (F, 7); "I don't think anyone likes him a lot. Well, maybe I would have asked for help, but this tutoring would probably have ended quickly, and I think I would leave with a bad taste in my mouth" (M, 7).

In tutoring, the availability of a partner is also important. Tutoring often requires a significant time commitment, so a partner who is willing to devote time without procrastination is desirable: "whenever someone asks him for help with some tasks, he never leaves them to deal with it on their own. Even if he was very busy, he would find time to meet in the locker room in the morning" (M, 8).

Patience is also key, as different students need different amounts of time to understand the material: "[she] tends to be the kind of person who wants to teach you something at all costs, and she'll keep explaining it to you until you finally understand it" (M, 8). In addition, according to participants, it is important to appreciate the student's efforts and respect their unique needs. Participants also indicate that they expect discretion from the person to whom they would turn for help:

> I would be afraid to say anything to them. They seemingly don't want to do badly, but they are chattering left and right. I wouldn't want to trust them with any of my secrets. In this field I would sooner turn to Igor than to them. (F, 7)

They also stress that kindness is important to create a positive atmosphere in which they can ask questions freely and express their difficulties: "I never know if he is serious or making fun of me. I don't want to wonder at every turn if he is listening to me seriously and if he will make fun of me later" (F, 8).

Discussion

Listening to students talk about their preferences, standards and criteria that influenced their choices of partners to work together on learning tasks revealed both a set of desirable partner behaviours, and the types of collaborative situations that appear to differentiate perceptions of the attractiveness of those behaviours.

They captured which attributes of the cooperation partner the students consider important and which attributes they report as critical to trust. In addition, it was documented that certain partner behaviours were valued differently depending on the circumstances of the collaboration, and the attractiveness of specific classmates as collaboration partners may have increased or decreased. This captures the set of attributes of the desired and avoided partner is more diverse and task specific.

A priority in this study was to give students a voice in the matter in order to better understand what students in the final years of elementary schools consider to be the conditions for successful group work, according to their experiences in small groups (Chiriac & Granström, 2012; Florez & McCaslin, 2008; Krawczyk-Bryłka & Nowicki, 2020). Alternatively, the attributes of team members needed to be a desirable collaborative partner could have been assessed using a survey instrument, a ready-made taxonomy of theoretically postulated skills. Many studies to date have used such predetermined criteria to assess group skills and team member performance (e.g., Dommeyer, 2007; Ladd et al., 2014).

However, many benefits can be gained from discovering preferences, standards and criteria based on student reports. As shown earlier, the students' opinions provide a "window into the team's process" (Fredrick, 2008, p. 450). The students' statements can be enlightening, and in addition, they provide a simple way to discover the sources of resistance and challenges that young people face on a daily basis when managing conflicts in teamwork (Rees, 2009; Shimazoe & Aldrich, 2010; Zwierzyńska, 2008).

Student reports indicate that a barrier to valued group membership is "social loafing". Consistent with previous research (e.g., Chen & Gong, 2018; Hilton & Phillips, 2010; Neu, 2018), students in this study reported a preference for collaborating with friends and with trusted peers, as well as self-selected teams, and put a lot of effort into connecting with preferred partners and avoiding undesirable social partners and contexts. This reported resistance on the part of participants (to the imposition of group composition and the inclusion in teams of people considered to be low in credibility) demonstrates the fears and challenges that exhaustive confrontation with the tensions and clashes that result from mismatches can cause.

In addition, from the students' perspective, teams formed using the self-selection method compared to teams with top-down assignments differed significantly in several key aspects. Above all, teams that students did not choose had more difficulty developing trust due to sometimes conflicting goals and motivation levels (e.g., not everyone wants to get good grades or perform well on a given task), as previous studies have shown (Aggarwal & O'Brien, 2008; Chiriac & Granström, 2012). Alternatively, in self-selected teams based on social ties and trust, partners share a common vision of tasks and have similar expectations, minimise disruptions and conflicts, and quickly reach a consensus on core issues (principles, inputs).

The findings concerning student dissatisfaction with collaborative partners who do not engage during a team project are partly consistent with the growing body of research on "social vanity" (e.g., Aggarwal & O'Brien, 2008; Krawczyk-Bryłka & Nowicki, 2020; Rusticus & Justus 2019). Potential "nonslackers" in "groups with slackers" (Dommeyer, 2007, p. 175) complain that some members fail to fulfil their responsibilities by creating a greater workload for other group members, and report unilateral or unequal investment of effort as a central challenge of group work formats. Partners who violate the rules and prevent other members from benefiting instead of facilitating were also rated particularly low in this survey. Participants described problematic and avoidant members as those who "often" or "always" fail to perform assigned duties (correctly, on time or not at all), fail to show commitment, start off-task conversations at inappropriate times, react in an inflexible, uncoordinated manner, and exhibit difficulties in self-regulation. This suggests that these behaviours pose a threat to being seen as an "equal partner" and are considered by students to be particularly detrimental to productive participation in joint tasks.

Researchers have already documented that trust in groups is based on reliability (Konieczna, 2020; Rees, 2009). In this study, we extend this understanding because participants' reports in which they share their experiences of problematic decisions regarding partner choice provide important evidence that central to trust from the students' perspective is whether partners knew how to make others feel comfortable. From the students' point of view, doing their own part of the work is important, and represents some minimum contribution by virtue of "partnering" and evidence of proving themselves as a partner. But participants' comments also pointed to their partner's highly rated agreeableness and skills, which are described in literature as a willingness to resolve disagreements and offer support, or kindness (Breuer et al., 2020; Ladd et al., 2014; Rees, 2009). Students reported that in groups balanced in terms of caring, reciprocity, and efforts to maintain a good atmosphere, they bypassed stormy pre-negotiations and efforts to correct, monitor, support, and plan. Qualitative descriptions of partner behaviour confirm that comfortable interactions, avoidance of wasting time, and the cost of friction associated with conflict management can compensate for the low-quality input of a friend-partner or a well-liked friend-partner. Social preferences may therefore reflect the undervalued role of teachers in providing comfort and a pleasant atmosphere when working together with others (Rees, 2009). In addition, from the students' perspective, selectively choosing classmates who are highly trusted fosters cooperative behaviour and allows them to act competently within their social comfort zones (Chapman et al., 2006; Chiriac & Granström, 2012; Hilton & Phillips, 2010; Konieczna, 2020).

The findings also suggest that there is no "universal" set of attributes of a desirable partner which are critical to trust. This is because this study has shown that these four collaborative situations (teamwork in class, sports games, sharing a desk, and peer tutoring) create different challenges for students working in teams, and each situation has its pitfalls. It has already been suggested that cooperation can be more effective and rewarding when partners understand these differences, are flexible, and can adapt their behaviour

to the specific requirements in the situation at hand (Ladd et al., 2014). However, through this small exploratory study, the variability and situational nature of expectations, priorities, selection criteria, and rank of individual attributes was recognised. There is reason to believe that students are aware that the attributes they have identified as desirable in partners in a particular context are not always applicable to a different collaboration situation. This confirms that students' preferences are reached by considering the risks and benefits of the context (Kanevsky et al., 2022; Koutrouba et al., 2012).

This study has various practical implications significant for promoting effective teamwork in the classroom. Educational interventions that prepare for teamwork or support partner readiness, as well as developed teamwork assessments, can be better tailored if we identify what students perceive as problematic elements and barriers to working together in a given context (Breuer et al., 2020; Dommeyer, 2007). Students and teachers who are involved in implementing group work in different roles reveal a varied understanding of the conditions for successful group work, productivity, the benefits of group work, and what happens during group work (Chiriac & Granström, 2012). Therefore, some sources of resistance and obstacles faced by students may be overlooked by teachers because they may not be considered significant, go unnoticed, or are not disclosed.

This research can not only clarify how students think about effective teamwork and why some classmates are perceived as poor partners in some tasks and more attractive in others. It also provides teachers with a better mechanism for identifying and resolving group-related issues. Monitoring each team member's contribution is recommended as a way to promote individual accountability, reflection, and group cohesion. According to the social interdependence theory (Johnson & Johnson, 2009), groups that discuss expectations before starting group work, consider each member's contribution and group dynamics, have opportunities to give feedback to group members, and inform the instructor about group problems, have a greater sense of security and satisfaction, and encourage students to engage in group activities (Aggarwal & O'Brien, 2008; Dommeyer, 2007).

Limitations

There are limitations in the current study that may affect the results obtained, which should be interpreted with caution. First, it is possible that assessment bias and perception biases in classmates may have affected the types of identified attributes of collaborative partners. Student reports (perceptions) were the main source of data, and for this reason, the identified behaviours may not fully represent those emerging from other methodologies (e.g., independent observers, teacher reports, etc.). Second, the way students evaluate the involvement of cooperation partners may differ from their actual beliefs, which have not been disclosed, and this may interfere with the reliability of evaluations. Third, participant demographics were not included in the analysis, so it is not known whether teams may have differed in important baseline characteristics (such as gender, diversity, classroom seniority). This may have influenced participants' preferences or perceptions of collaboration partners. Fourth, the sample was small, which may have affected the generalisability of these results.

Despite the shortcomings, the themes emerging in the students' comments were relatively independent of theoretical preconceptions and offered some nuanced insights that inspire continued research.

Conclusions

Drawing on insights from students in the final years of elementary school, this work focuses on various aspects of the perceived trustworthiness of classmates and identifies a set of critical attributes that help find and filter partners with whom they collaborate, would collaborate, or would prefer to avoid collaborating. In addition, the research uncovered how the key characteristics of a preferred and avoided team member for trust change depending on the situation (a team task in class, a sports game, sharing a desk, peer tutoring). Preferences proved to be variable and varied depending on the type of cooperation and the nature of the joint task to be performed.

The findings indicate that preparing students to work together harmoniously and productively can be important for designing effective and friendly collaborative environments. However, there should be more recognition of how students themselves define "partnering," and how they perceive the barriers to valued group membership in a given context. The analyses also encourage more reflective use of the method of assigning students to dyads and small working groups.

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Education without aptitude: mismatched vocational personalities for professional placements

Abstract

Selecting academic fields at university level reflects career interests, which must be aligned with vocational personalities to avoid job dissatisfaction in the future. Since no earlier studies were conducted in Pakistan to investigate the compatibility between vocational personalities and career interests of university students, the current study aims to address this knowledge gap for the first time in the country. The study also highlights the role of aptitude testing before being enrolled in a university. As a quantitative survey, the study administered the O*Net Interest Profiler on 1503 conveniently selected graduating male and female students at different universities in Pakistan, with the analysis of vocational personalities based on Holland's RIASEC codes. The results show that students of pure sciences, social sciences, architecture, fine arts, and psychology choose academic disciplines in alignment with their vocational personalities. Students of computer sciences, management sciences, electrical engineering, accounting & finance, and mathematics, however, do not select their academic fields in alignment with their vocational personalities. The studied male students were significantly more realistic, enterprising and conventional, whereas the female students were significantly more investigative, artistic and social. The study suggests that stakeholders should provide aptitude testing and career counseling at school and college levels to obtain the best human resources for the country.

Keywords: career interests, vocational personality, academic disciplines, aptitude, career counseling, Pakistan

Introduction

A career is the lifetime occupational progress that a person makes inside or outside the workplace (Sullivan & Baruch, 2009), and career planning is a very important cognitive process through which students decide about their careers. This process usually takes place in adolescence (Helwig, 2008; Lee & Rojewski, 2009; Witko et al., 2005) for academic purposes, with the career choices of students influenced by several psychosocial factors, such as their upbringing (Raque-Bogdan et al., 2013), parental suggestions (Chen & Fouad, 2013; Duffy & Dik, 2009; Dustmann, 2004; Fouad et al., 2016; Hairston, 2000; Howard et al., 2015; Kumar, 2016; Mokoro et al., 2014), suggestions by family members (Choo et al., 2012), peer pressure (Hashim & Embong, 2015), gender stereotyping (Gil-Flores et al., 2011; Novakovic & Fouad, 2013; Watt et al., 2012), vocational interests and perceived abilities (Russell, 2001), self-efficacy (Bandura et al., 2001; Garcia et al., 2015; Van Dinther et al., 2011), career competencies, career opportunities, resources (Akkermans et al., 2015; Akkermans & Tims, 2017; Colakoglu, 2011; Hall, 2004; Kuijpers et al., 2006; Parker et al., 2009; Walsh et al., 2005; Wittekind et al., 2010), work conditions (Bryson, 2004; Robinson et al., 2016), influence of role-models (Gibson, 2004), occupation value (Chen & Fouad, 2013; Raque-Bogdan et al., 2013), and career shock (Hirschi, 2010).

Earlier career-related research focused on several interlinked career aspects. Career choice and development, for example, is a process of developing and implementing a person's self-concept (Super, 1969; 1980), a process that requires a high level of

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cognitive proficiency (Gottfredson, 1981). Career competencies, such as skills, knowledge and abilities of an individual that contribute to career development (Akkermans et al., 2013), lead to employability (Wittekind et al., 2010) and success (Arthur et al., 2005; Briscoe et al., 2006). Career resources, on the other hand, help individuals better understand their work in order to develop and maintain employability for a longer period (Bridgstock, 2009; Forrier & Sels, 2003). Career success is a work-related accomplishment and can be divided into subjective (personal job satisfaction) and objective (external incentives gained from the career) success (Arthur et al., 2005; Colakoglu, 2011; Eby et al., 2003; Heslin, 2005; Van Der Heijde & Van Der Heijden, 2006). Likewise, career shocks can also be positive, e.g. unexpected promotions, and negative, e.g. unexpected job losses (Akkermans et al., 2018).

In the past few decades, Holland's theory (Holland, 1997) has been a guide for career interest assessment, gaining significant international popularity. Holland suggests that vocational interest is an expression of one's personality, and that vocational interests can be conceptualised into six typologies – Realistic (R), i.e. preferring hands-on activities with practical goals; Investigative (I), i.e. preferring activities in which a person can work toward the resolution of mathematical or scientific problems; Artistic (A), i.e. often being comfortable with ambiguity in the workspace or a project, and preferring activities in which a person can use creativity and expressivity to create something new, such as art or music; Social (S), i.e. preferring activities in which a person can teach, help, or provide information to others; Enterprising (E), i.e. generally enjoying activities in which a person can work with others to lead or persuade them; and Conventional (C), i.e. preferring work with data, such as numbers or records, to present and store it in a systematic and orderly way. This theory also suggests measuring a person's primary and secondary interests during the evaluation so that they can have a wide range of career choices. The congruence hypothesis in Holland's theory suggests that individuals are more likely to experience job satisfaction, stability and success when there is a high degree of match, or congruence, between their personality type and their work environment. This hypothesis is grounded in the idea that people seek environments that allow them to use their skills and abilities, express their values and attitudes, and take on agreeable roles and problems. Researchers have supported this model and have highlighted its contribution to research, career evaluation, and career counseling (Armstrong et al., 2003; Darcy & Tracey, 2007; Su et al., 2009).

Education, in addition to its role in cognition, moral development (Husain, 2021b), and psychosocial health (Husain, 2021a), is usually directed towards its social output (Eisele, 1980), enabling students to be ready to perform the desired social roles and apply knowledge in practical situations (Husain et al., 2023; Moran, 2018). The educational disciplines, therefore, must be aligned with the career interests of the students. A meta-analysis (Hanna & Rounds, 2020) investigated 100 years of earlier research on career interests, leading to a significant relationship between career interest and career choice. Pakistan, the sixth largest population in the world, is a developing country, and the state of education in Pakistan is not satisfactory (Husain & Faize, 2021). Apart from a documented National Education Policy, the country deeply lacks research in monitoring and evaluating the education being imparted in public and private institutions. Educational methodologies are not sufficiently aligned with modern means of information management (Faize & Husain, 2021; Faize et al., 2018), and students face substantial issues, especially at higher levels (Faize, 2015). Teachers, on the other hand, also face several psychosocial problems (Husain et al., 2016). The current study is the first such study in Pakistan to measure the career interests of Pakistani students using Holland's RIASEC codes, to analyse the compatibility of career interests with the vocational personalities of the students.

Method

Participants

The current study covers 1503 graduating students selected from different universities in Pakistan, including both male (n = 785) and female (n = 718) students enrolled in different Bachelor of Science (BS) disciplines, which, for the purpose of this study, were categorised into 9 domains, e.g. Computer Sciences, Management Sciences, Pure Sciences (Biology, Chemistry, Physics, etc.), Social Sciences (Sociology, Anthropology, Social Work, etc.), Electrical Engineering, Accounting & Finance, Mathematics, Architecture & Fine Arts, and Psychology. Psychology was analysed separately from the social sciences due to the special interests of the researchers.

Instrument

An "Interest Profiler" (Lewis & Rivkin, 1999) was administered in the current study along with a brief demographic schedule. The Interest Profiler is based on John Holland's theory of vocational personality, which proposes six vocational personality types. Holland believed that people can be described by one of these six vocational personality types, i.e. Realistic, Investigative, Artistic, Social, Enterprising and Conventional. The self-administered scale comprises 72 items and can be completed in 5 to 10 minutes, with each item having three possible options, i.e. like, unsure, and dislike. Only the frequency of likes is counted for calculating the results. The initial reliability of the test and its sub-scales was above 90 as recorded by its authors, and the test was considered valid by its authors in different groups based on age, gender, ethnicity, educational level, occupational group, etc. The Interest Profiler also provides a list of various academic disciplines, associating those disciplines

with compatible professions. Furthermore, the test recommends different professions based on specific vocational personalities.

Procedure

The researchers approached the graduating students at different universities in Pakistan with the help of faculty members. The instrument of the current study, which is a self-respondent inventory, was administered in groups, and the instructions and purpose of the study were made clear to the participants, who were willingly selected. The data gathered was analysed using the Statistical Package for Social Sciences, with all the procedures performed in this study conducted in accordance with the 1964 Helsinki declaration.

Results

The Interest Profiler showed good reliability, with a Cronbach's alpha value of 0.871 (Table 1), and all the sub-scales of the instrument were also found reliable with alpha values between 0.621 to 0.743 (Table 1).

The most represented vocational personality of Pakistani students was 'social', and the least represented was 'realistic' (Tables 1 & 2). The results show that students of pure sciences, social sciences, architecture, fine arts, and psychology chose academic disciplines aligned with their career interests (Tables 2, 3, 4 & 5), while the students of computer sciences, management sciences, electrical engineering, accounting & finance, and mathematics, however, did not select their academic fields in alignment with their career interests (Tables 2, 3, 4 & 5). Social vocational personality remained the primary vocational personality for the majority of students in each academic discipline (Table 3).

A gender-based analysis (table 6) revealed that the studied male students were significantly more realistic ($M = 5.27$ vs 4.62; $p = 0.000$; Cohen's $d = 0.25$), enterprising ($M = 5.38$ vs 4.71; $p = 0.027$; Cohen's $d = 0.11$), and conventional ($M = 6.02$ vs 4.46; $p = 0.000$; Cohen's $d = 0.52$); while female students were significantly more investigative ($M = 6.09$ vs 5.76; $p = 0.000$; Cohen's $d = 0.11$), artistic ($M = 6.25$ vs 5.61; $p = 0.000$; Cohen's $d = 0.21$), and social ($M = 7.52$ vs 6.32; $p = 0.000$; Cohen's $d = 0.41$).

Table 1

Descriptive statistics of Career Interest Profiler (n = 1503)

Variable	Items	α	*M*	*SD*	%	Range		Skewness	Kurtosis
						Potential	Actual		
Career Interest Profiler	72	0.871	34.051	11.113	47.292	0–72	1–72	0.104	0.062
Realistic (R)	12	0.621	4.962	2.593	41.351	0–12	0–12	0.160	–0.520
Investigative (I)	12	0.699	5.921	2.878	49.346	0–12	0–12	0.009	–0.646
Artistic (A)	12	0.727	5.921	2.962	49.346	0–12	0–12	0.028	–0.731
Social (S)	12	0.736	6.900	2.974	57.496	0–12	0–12	–0.219	–0.669
Enterprising (E)	12	0.635	5.067	2.601	42.221	0–12	0–12	0.228	–0.392
Conventional (C)	12	0.743	5.279	3.033	43.995	0–12	0–12	0.119	–0.0807

Note. α = Cronbach's alpha; *M* = Mean; *SD* = Standard Deviation.

Source: authors' own work.

Table 2

Mean Scores of the students from different academic disciplines on each career interest and their primary and secondary areas of career interest

Academic Disciplines	N	R	I	A	S	E	C	PI	SI
Computer Sciences	366	5.175	5.773	5.617	6.377	5.213	6.265	S	C
Management Sciences	414	5.104	5.626	5.720	6.582	5.715	5.686	S	A
Pure Sciences	103	4.602	7.078	5.874	7.379	3.883	4.146	S	I
Social Sciences	163	5.196	5.859	6.730	6.926	5.166	4.988	S	A
Electrical Engineering	113	5.071	5.398	5.681	6.611	4.726	5.221	S	A
Accounting & Finance	70	5.343	6.100	6.543	6.943	5.643	5.386	S	A
Mathematics	11	4.364	4.818	5.000	7.364	5.273	5.182	S	E
Architecture & Fine Arts	53	5.343	6.100	6.543	6.943	5.643	5.386	S	A
Psychology	210	4.243	6.643	5.962	8.314	4.257	3.529	S	I

Note. N – Number of students; R – Realistic; I – Investigative; A – Artistic; S – Social; E – Enterprising; C – Conventional; PI – Primary Interest; SI – Secondary Interest.

Source: authors' own work.

Table 3
Percentage of discipline-wise students according to their primary career interest

Academic Disciplines	Realistic	Investigative	Artistic	Social	Enterprising	Conventional
Computer Sciences	0.00	22.68	20.49	24.32	11.75	20.77
Business & Management Sciences	0.00	22.71	20.05	29.23	12.80	15.22
Pure Sciences	0.00	43.69	18.45	29.13	2.91	5.83
Electrical Engineering	0.00	22.12	24.78	32.74	9.73	10.62
Accounting & Finance	0.00	28.57	21.43	25.71	8.57	15.71
Psychology	0.00	28.57	19.05	45.71	3.81	2.86
Maths	0.00	9.09	18.18	54.55	9.09	9.09
Architecture & Fine Arts	0.00	13.21	35.85	37.74	3.77	9.43
Social Sciences	0.00	20.86	32.52	28.22	7.98	10.43

Source: authors' own work.

Table 4
The compatible academic disciplines for different career interests as stated in the instrument

Career Interest	Compatible Academic Disciplines
Realistic	Trades people – carpenters, electricians, mechanics, plumbers; Agriculture and forestry; Engineering; military
Investigative	Biology, chemistry, physics; Computer programmers, computer engineers; Physician, pharmacist, psychologist, veterinarian; Technical writer
Artistic	Musicians, artists, graphic artists, advertising, design, writers/editors
Social	Nursing, counselling, teaching, clergy
Enterprising	Business management, sales, politics, small business owner, real estate
Conventional	Accounting, banking and finance, clerical/secretarial, business administration, insurance – adjuster/underwriter

Source: authors' own work.

Table 5
The compatibility between Primary and Secondary Career Interests and Opted Academic Disciplines

Opted Academic Disciplines	Primary Interest	Secondary Interest	Ideal Interest/s
Computer Sciences	Social ×	Conventional ×	Investigative
Management Sciences	Social ×	Artistic ×	Enterprising, Conventional
Pure Sciences	Social ×	Investigative ✓	Investigative
Social Sciences	Social ✓	Artistic ×	Social
Electrical Engineering	Social ×	Artistic ×	Realistic
Accounting & Finance	Social ×	Artistic ×	Conventional
Mathematics	Social ×	Enterprising ×	Investigative, Conventional
Architecture & Fine Arts	Social ×	Artistic ✓	Artistic, Realistic
Psychology	Social ✓	Investigative ✓	Social, Investigative

Source: authors' own work.

Table 6
The differences in the vocational personalities of boys and girls

Variable	Boys		Girls		$t(1501)$	p	Cohen's d
	M	*SD*	*M*	*SD*			
Realistic	5.273	2.507	4.623	2.644	4.892	0.000	0.253
Investigative	5.764	2.798	6.093	2.955	2.217	0.027	0.114
Artistic	5.618	2.896	6.253	2.999	4.179	0.000	0.216
Social	6.327	2.954	7.525	2.869	7.959	0.000	0.411
Enterprising	5.389	2.575	4.714	2.586	5.059	0.000	0.261
Conventional	6.020	2.889	4.469	2.981	10.240	0.000	0.529

Source: authors' own work.

Table 7
The differences in matching the ideal interest of boys and girls

Variable	Ideal Interest/s	Boys		Girls		*t*	*p*	Cohen's *d*
		M	*SD*	*M*	*SD*			
Computer Sciences	Investigative	5.717	2.856	5.928	2.822	0.624	0.533	–
Management Sciences	Enterprising	5.909	2.385	5.410	2.349	2.088	0.037	0.211
	Conventional	5.988	2.752	5.211	2.728	2.810	0.005	0.283
Pure Sciences	Investigative	7.219	3.149	7.014	2.851	0.326	0.745	–
Social Sciences	Social	6.087	3.355	7.543	2.913	2.955	0.004	0.468
Electrical Engineering	Realistic	5.232	2.322	4.645	2.317	1.199	0.233	–
Accounting & Finance	Conventional	6.000	3.421	4.771	3.456	1.495	0.140	–
Mathematics	Investigative	3.333	2.517	5.375	3.204	0.984	0.351	–
	Conventional	4.000	1.732	5.625	2.925	0.887	0.398	–
Architecture & Fine Arts	Artistic	6.643	3.365	7.026	2.631	0.433	0.667	–
	Realistic	4.571	2.875	4.615	2.592	0.053	0.958	–
Psychology	Social	6.429	2.686	8.604	2.814	3.831	0.000	0.778
	Investigative	6.500	2.822	6.665	3.042	0.269	0.788	–

Source: authors' own work.

A discipline-wise analysis was also conducted to measure the gender-based differences in the appropriate selection of academic disciplines (table 7), revealing that male management sciences students ($M = 5.90$ for enterprising vocational personality & 5.98 for conventional vocational personality vs 5.41 & 5.21 respectively; $p = 0.037$; Cohen's $d = 0.21$) selected their academic discipline significantly better than female students of the same discipline. Female students of social sciences (the ideal vocational personality being social; $M = 7.54$ vs 6.08; $p = 0.004$; Cohen's $d = 0.46$) and psychology (the ideal vocational personality being social; $M = 8.60$ vs 6.42; $p = 0.000$; Cohen's $d = 0.77$), on the other hand, selected their academic disciplines significantly better than male students of the same disciplines.

Discussion

The current investigation was designed to measure the compatibility between career interests and vocational personalities, with a survey of Pakistani university students conducted to see if the students had chosen their academic disciplines in accordance with their vocational personalities. The instrument used in the study proposed the ideal academic fields for all six RIASEC personalities, and the respondents were assessed based on these ideal primary and secondary vocational personalities (Table 4). The results revealed that students of pure sciences, social sciences, architecture, fine arts, and psychology chose their academic disciplines in alignment with their career interests. On the other hand, students of computer sciences, management sciences, electrical engineering, accounting & finance, and mathematics did not select academic fields aligned with their career interests. This mismatch is mainly because of the non-availability of career counseling services in Pakistani educational institutions, whereas career counseling is commonly offered in the educational institutions of developed countries. Most of the educational institutions in Pakistan do not offer any aptitude testing or career counseling for students (Khan, 2010; Yaqoob et al., 2017). In addition to students, the general population in Pakistan is at risk of several psychological problems (Husain, 2018), with the local culture not permitting people to look for professional counseling (Husain, 2020), and the need for professional counseling in the country not significantly realised (Husain & Faize, 2020). The educated population, however, must acknowledge the need for career counseling services within the educational system of Pakistan (Zahid et al., 2020), which should equally address both students and teachers, as teachers also need counseling to overcome depression, anxiety and stress (Husain et al., 2016).

The gender-based analysis revealed that the studied male students were significantly more realistic, enterprising and conventional; while female students were significantly more investigative, artistic and social, and scholars identified significant gender-based differences in career interests (Morris, 2016). Social and artistic qualities, for example, were generally found to be more prevalent among females (Betz & Klein, 1996; Costa et al., 1984; Gianakos & Subich, 1988; Henry & Bardo, 1987; Smart, 1989; Varca & Shaffer, 1982; Walsh et al., 1986; Walsh & Huston, 1988). Some studies (Murray & Hall, 2001) found greater manifestations of Realistic career interests in males compared to females. A meta-analysis revealed that men prefer working with objects, while women prefer working with people (Su et al., 2009). Men showed strong realistic and investigative interests, whereas women reflected strong artistic and conventional interests (Su et al., 2009). A significant increase in enterprising

interests among females and a significant decrease in realistic, investigative, and artistic interests among males was also observed over time (Bubany & Hansen, 2011). The gender-based differences in career interests have greater associations with cultural and vocational demands. Women in many other parts of the world (Warner Colleen & Warner, 2005) have been assigned to the role of housewives instead of being allowed to work professionally. However, women have started broadening their career inspirations in the last few decades, opting for unconventional careers (Inglehart et al., 2003). The highest mean score for all academic disciplines belonged to social vocational personality, regardless of gender, a trend that can be attributed to the cultural emphasis on collectivism and social harmony, which prioritises interpersonal relationships and communal well-being. Pakistani society highly values professions that involve helping others and maintaining social cohesion, such as teaching, healthcare, and social work, in line with the characteristics of the social personality type. The same role of gender socialisation and stereotypes about career interests was also established by earlier researchers (Morris, 2016).

Recommendations

The findings of the current study highlight the incompatibility between career interests and academic choices among Pakistani students, reflecting the adverse effects of the unavailability of career counseling services in the educational institutions of the country, emphasising the importance of career counseling and aptitude testing services inside the educational institutes of the country. Making career-related decisions is not an easy task for most students (Bland & Roberts-Pittman, 2014). Selecting a single occupation from among thousands is a lifetime decision (Kochhar, 1984), and remains a crucial task for students, although for most students, their career choice is made by their parents (Taveira et al., 1998). Career counseling is necessary throughout one's career, for professional growth and success (Whiston et al., 2003). The effectiveness of career counseling services has been widely established to facilitate students in selecting their careers and managing psychosocial stressors in this regard (Appleby, 2018; Atchley et al., 2012; Ciarocco, 2018; Renn et al., 2014; Schwartz et al., 2018). Career selection is a stressful task for students, and career counseling can help reduce this stress (Eley et al., 2007), enabling students to choose the best-suited career. Students who receive career counseling are more passionate about their careers, more productive, have high retention rates, and are highly motivated in their professions (Whiston & Quinby, 2009), while students who do not receive proper career counseling more often make wrong career choices (Salami, 2008). The Ministry of Education of Pakistan and the management of educational institutions of the country are therefore advised to initiate career counseling and aptitude testing services within the existing educational setups, while students are also advised to consult online resources for aptitude testing and measuring their career interests. This strategy is also well established in helping students choose an appropriate career (Beard et al., 2012; Golding et al., 2018), and they can also consult senior students and alumni for advice (Lawson, 2018), or pay visits to different organisations in order to observe the work and decide about their career (Beard et al., 2012).

Limitations

As the study lacked funding and was conducted with limited resources, its scope was restricted to only bachelor students. The findings could have been more intriguing had we also included students pursuing MS, MPhil, and PhD degrees, so future researchers are encouraged to incorporate participants from diverse educational backgrounds to obtain a more comprehensive perspective. Furthermore, the current study could have been enriched by including individuals from various professions in addition to students.

Conclusion

The current study is the first of its nature in Pakistan, with the aim to measure the career interests of students and analyse the compatibility between vocational personalities and career interests. The current study is highly significant in its theory and scope, revealing that many Pakistani students have been unable to develop valid and reliable career interests, the prime reason being the lack of career-based assessments and counseling in Pakistani educational institutions. The current study also aims to sensitise the Ministry of Education, the Higher Education Commission, and educational institutions in the country to recognise this huge gap within the educational system and to address it professionally. The negative consequences of this shortfall can result in job-related dissatisfaction and poor organisational performance, so students should be evaluated for their vocational personalities before university admission.

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Dawid Banaś

Economic education of people with disabilities as a tool supporting social inclusion

Abstract

Economic education is becoming increasingly essential for modern societies to function. It consists of three aspects: knowledge, skills and attitudes, and if such aspects remain at a low level, the people it concerns are susceptible to financial exclusion. Due to dynamic changes occurring in financial markets, knowledge quickly becomes outdated and needs to be frequently updated. People with disabilities fall into this group of people at risk of social exclusion, usually displaying lower participation in the educational system (although this has been changing) and facing greater difficulties in the labour market. A hypothesis has been posed that economic education may contribute to the social inclusion of people with disabilities, and the determined goal was to demonstrate the existence of the need for financial education targeted at people with disabilities to make them less susceptible to the risk of social and financial exclusion. This goal was achieved through critical analysis of the literature on the subject, and by way of deduction. The author's research demonstrated that economic education is a tool that contributes to reducing the risk of social and financial exclusion, and therefore economic education should be primarily targeted at the groups most susceptible to the risk of exclusion, including, among others, people with disabilities. The paper demonstrates that Poland also lacks measures that would contribute to the level of economic knowledge of that social group.

Keywords: financial education, people with disabilities, social exclusion, financial exclusion, inclusion

Introduction

Banking and the entire financial sector have been subject to continuous changes, with processes largely targeted at digitisation and moving towards a network economy (Folwarski, 2021a, p. 13). By implementing a series of innovations, the Polish banking sector has kept up with the pace of growth of the 'older' EU Member States (Kotliński, 2016, p. 7), and one could even say that the entire financial sector in Poland has been geared towards the implementation of innovation (Szpyt, 2024, p. 4). It is worth keeping in mind that even though such measures are beneficial for the economy, they force society to improve its competencies, and financial education is the answer to improving skills, knowledge and attitudes, and may take the form of formal or informal education (Maciejasz-Świątkiewicz, 2017; Świecka, 2016, p. 92).

Insufficient financial knowledge contributes to financial exclusion, which may consequently result in social exclusion. Through a certain obligation to use the Internet, the technological development in the financial sector has also contributed to digital exclusion, since not everyone has access to the Internet. The above-mentioned types of exclusions are interrelated, fostering an exclusion that everyone is susceptible to, although to a different degree.

Therefore, the author believes that everyone should be able to develop their competencies in the field of economic education, in accordance with the concept of lifelong learning, positively affecting the people who improve their competencies and the entire economy (Kuchciak et al., 2014, p. 164). Measures in this scope are undertaken by central

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banks of various states[1], as well as by financial institutions and non-governmental organisations, although they are mainly targeted at young people (school and university students) who have a higher potential of becoming new customers for the banks[2]. Such initiatives are much less frequently targeted at people who particularly run the risk of social exclusion, such as people with low or irregular income, the elderly, and people with disabilities. Solarz argues (2019, p. 15) that if financial institutions focus only on those who can be self-served, financial exclusion will follow.

In this paper, the author decided to identify the gap caused by the lack of initiatives that pertain to the economic education of people with disabilities, since this contributes to minimising their exposure to exclusion, with a hypothesis posed that economic education may contribute to the social inclusion of people with disabilities. In addition, the determined goal was to demonstrate the existence of the need for financial education targeted at people with disabilities to make them less susceptible to the risk of social and financial exclusion. To achieve this goal, a critical analysis of the literature on the subject was conducted, by means of a deduction. This paper consists of three parts and a summary. The first part addresses the issue of exclusion that people with disabilities are largely exposed to, while the second part presents the need for economic education of citizens of modern societies. Finally, conclusions from the review of research were presented to show how economic education may be used as a tool for social inclusion.

Exclusion of people with disabilities – a problem that still exists

Disability is a phenomenon that is viewed from several perspectives, although the perception of it has changed over time. Various models have been created to describe the relations between a person with a disability and the society in which the person functions. The following types of disabilities are identified in the literature (Wodecki, 2020):

- the charity model, where the person with a disability should passively accept assistance from society;
- the medical model, where disability is perceived through an illness deemed to be the result of physical or mental limitation of an individual nature;
- the social model, where disability is the result of limitations caused by the fully-abled part of society. This results in the transfer of responsibility for exclusion to society, as it agrees to various forms of barriers, such as architectural barriers;
- the biopsychosocial model, which is the most complex one, and a certain combination of the medical and social model by way of synthesis, which also takes into account the legal aspect.

It should also be stressed that people with disabilities are a highly diversified group, which follows the fact that certain conditions may trigger limitations. There are many types, but it is worth remembering that the classification is not exhaustive:

- vision disability,
- hearing disability,
- mobility hearing,
- neurological conditions, including neurodegenerative diseases;
- mental disability.

It is incredibly difficult to clearly define the phenomenon of exclusion, which largely follows the complexity, and dynamic and multi-dimensional nature of that phenomenon. Given the limitations imposed by the length of this paper, the author presents three types of exclusion, which, in the author's view, people with disabilities are exposed to: social exclusion, financial exclusion and digital exclusion. There are causal links among all of them, which are essential from the viewpoint of the issues discussed in the paper.

While discussing the topic of exclusion, it is worth starting with social exclusion, as it is deemed to be the reason for financial exclusion (Szopa & Szopa, 2011, p. 13). Although colloquially this concept is quite often equalled with the concept of poverty, scientific discourse demonstrates that these concepts are not identical (Atkinson, 2017; Panek, 2011; Sen, 2002). Szarfenberg (2003, p. 17) believes that this is a situation that prevents, or largely prevents, the performance of social roles, or the use of social infrastructure or public goods. Frieske (2010, p. 3) also points to the issue of defining the concept of social exclusion, as he believes it to be amorphous, and that poverty might be a correlate of social exclusion. Golinowska (2008, pp. 116–117) points out that social exclusion is a multi-dimensional category, and thus it cannot be equated with poverty, while the multi-dimensional nature of the concept also brings about issues with categorising the definitions that have already been in use. Mazur and Kuć (2019, pp. 23–24) argue that social exclusion may be defined twofold, depending on the approach adopted – in terms of participation and distribution. Meanwhile, Dońska-Borsiak (2015, p. 7) proposes three groups into which explanations of this concept can be categorized: analytical, working and official.

While referring to financial exclusion, Frieske (2010, p. 2) points out that it is one of the dimensions of social exclusion and defines it as "restrictions in access to financial services, even the simplest ones,

[1] Educational activities pursued by selected banks were discussed by Janc and Warchlewska (2018) among others.
[2] Measures targeted by financial institutions at children and young people were reviewed by Maciejasz-Świątkiewicz (2017), among others.

such as a current account or taking out a bank loan under regular terms and conditions". Maciejasz-Świątkiewicz (2013) proposed one of the broadest definitions of financial exclusion:

> A process phenomenon that applies to the body of Issues faced by entities operating in the market of financial services in the sphere of their consumption, production and social cohesion, both of an individual and of the group (households), with regard to the access and ability to use the offer of financial products and services. Such difficulties could be caused through fault or no-fault, and their nature could be voluntary, forced, permanent, temporary, primary, secondary, comprehensive or partial, realised or unrealised. (pp. 38–39)

Warchlewska (2020, p. 126) carried out a wider review of the definition of financial exclusion. The multi-dimensional nature of the issues of financial exclusion resulted in factors affecting financial exclusion being detailed in the literature on the subject. The following types of exclusion could be identified (Kempson et al., 2000):

- geographical (insufficient number of outlets or too great a distance to branches or ATMs),
- caused by availability (no access to electronic banking),
- caused by conditions (services not tailored to client needs),
- caused by price (excessive fees),
- marketing (no interest in a given group as potential clients),
- self-exclusion (manifested by two aspects – voluntary resignation from the use of financial services or the lack of awareness of participation in the financial market (Cichowicz, 2016b, p. 74).

The issue of the causal link between social exclusion and financial exclusion is also the topic of academic discussions (among others Iwanicz-Drozdowska & Nowak, 2011, p. 27). Compared to Western European countries, Poland is quite specific, since financial exclusion usually results from social exclusion, while in the West, a reverse trend is usually true (Szopa & Szopa, 2011, p. 13). It should be also remembered that financial exclusion is not an issue that occurs only in countries with a low or medium level of development, but it also increasingly more often affects citizens of highly developed countries (Iwanicz-Drozdowska & Nowak, 2011, p. 20; Solarz, 2010, pp. 248–249). Therefore, measures should always be undertaken to prevent or mitigate the risk of exclusion.

While such factors refer to people with disabilities, it may be concluded that not all such factors affect them to an equal extent. As Warchlewska points out (2017, p. 40), self-exclusion, exclusion caused by certain conditions, and marketing exclusion affects the analysed group more often than the general society. Geographical exclusion is less prevalent, since the supply of essential aid accessories, such as induction loops, is a major issue for people with disabilities. The author believes that price is not a major factor of financial exclusion today, because banks and saving societies in Poland were obliged to start offering, as of 8 August 2018, a basic payment account offered free of charge pursuant to the so-called PAD (Directive…., 2014).

It is undeniable that households with people with disabilities face a greater risk of poverty, which could be the reason for financial and social exclusion.

One of the ways to prevent financial exclusion could be electronic banking, which reduces costs (both for the consumer and the bank) and greatly improves the aspect of availability, although this type of banking is also related to digital exclusion. Folwarski (2021b, p. 84) believes that Internet access is of paramount importance in this matter, with the entire issue of digital exclusion related to accessing and using information and communications technology. This concerns unequal access to devices that support Internet connections (Dijk, 2010), as well as social and psychological issues, such as the motivation to learn new skills. This phenomenon should be analysed on two (Kujawski, 2018) or three planes (Żuchowska-Skiba, 2020, p. 196). Firstly, it should be specified whether access exists and what infrastructural barriers, if any, make it difficult or prevent access to the Internet or the application. Secondly, it is necessary to focus on factors that affect barriers and mental limitations resulting from the lack of needs and motivation, which translates to digital exclusion, with such limitations including education, age or social status of a potential user. The third plane covers analyses that reveal relations between access to the technology and factors that affect that access, as well as the experience of individual users (Żuchowska-Skiba, 2020, p. 197).

In the age of widespread popularity of mobile devices, as well as major and dynamic technological advancement, partly forced by the COVID-19 pandemic, barriers to accessing the Internet and applications offered by various institutions hardly affect most people. The situation is different when it comes to people with disabilities, who often need to use assistive technologies. The main issue is the high cost, and also the fact that such technologies are developed in response to current needs and problems (Żuchowska-Skiba, 2020, pp. 197-198), so they might be obsolete when made available to a larger group of recipients, and therefore not always effective in combatting digital exclusion.

As Żuchowska-Skiba points out (2020, p. 198), the Internet assists people with disabilities in the processes of being self-reliant and making their own decisions. Based on the results of the *Social Diagnosis* project of 2015, Żuchowska-Skiba also points out that the use of banking services is one of the five most frequent activities performed online. Data presented by that author demonstrates that people who hold higher degree disability certificates use the potential of the Internet to a greater extent than people who

hold moderate or minor degree disability certificates (Żuchowska-Skiba, 2020, pp. 205–206). It should be noted that the *Social Diagnosis* has been discontinued, but based on data published by Statistics Poland it can be demonstrated that the share of households that own devices that support Internet access has been growing (Statistics Poland, 2024), which makes it reasonable to expect that the share of people who own and use such products has also increased among people with disabilities[3]. Therefore, this could be treated as an opportunity for inclusion for the group of people analysed in this paper by way of minimising marketing exclusion, and also due to its availability. This could also be potentially beneficial for banks, which could win new clients.

Activities pursued by financial institutions in order to minimise the risk of contracting the coronavirus resulted in making it easier for clients to get in touch remotely with bank employees, as well as in the simplification of procedures, such as opening a bank account based on taking a selfie. It could seem that such activities reduced the factors that affected financial exclusion, but it should be considered that people with disabilities, especially people affected by digital exclusion, face problems using these options in the first place. In addition, the author believes that it is still worth considering whether such services should continue to be offered by banks on an ongoing basis, as it will make it easier for many people to contact their financial institutions.

Digital exclusion is also prevented at the legal level. One such relevant act of law is the Act of 4 April 2019 on the Digital Availability of Websites and Mobile Application of Public Entities (Act of 4 April…, 2019), which requires public entities to ensure digital availability for all citizens. If such public entities are unable to ensure it, they are obliged to provide alternative access, such as a telephone contact number, with failure to comply with this obligation making them subject to financial penalties. However, as experts of the Widzialni Foundation argue, the level of availability of websites managed by the public administration stood merely at 36% in 2021 (Widzialni, 2021, p. 13).

The need for economic education in modern society

Economic education could be either formal or informal (Maciejasz-Świątkiewicz, 2017, p. 41; Świecka, 2016, p. 92), and is often targeted at specific groups, mostly children, young people and students, since financial institutions see them as potential clients. This can be seen on the *Map of financial education, 6th edition, part 1* (Czernek et al., 2017). It is also worth mentioning that the report does not list any initiatives that directly target people with disabilities. Frączek and Gagat Matuła (2019, p. 29) arrived at similar conclusions. When analysing the intellectual and capital potential of people affected by Asperger syndrome, they noticed that such people did not participate in activities related to financial education.

There is also a differentiation among entities that offer opportunities for increasing the level of economic knowledge, such as central banks, commercial banks, universities and foundations. Janc and Warchlewska (2018, p. 34) argue that such institutions need to work together to raise the awareness of consumers of banking services. The abundance of activities undertaken by such institutions has been inspiring. Activities of commercial banks alone can be broken down into three groups (Cichowicz, 2016a, p. 129):

- direct involvement of the institution,
- activation of employees, e.g. by way of employee voluntary programmes,
- setting up a foundation.

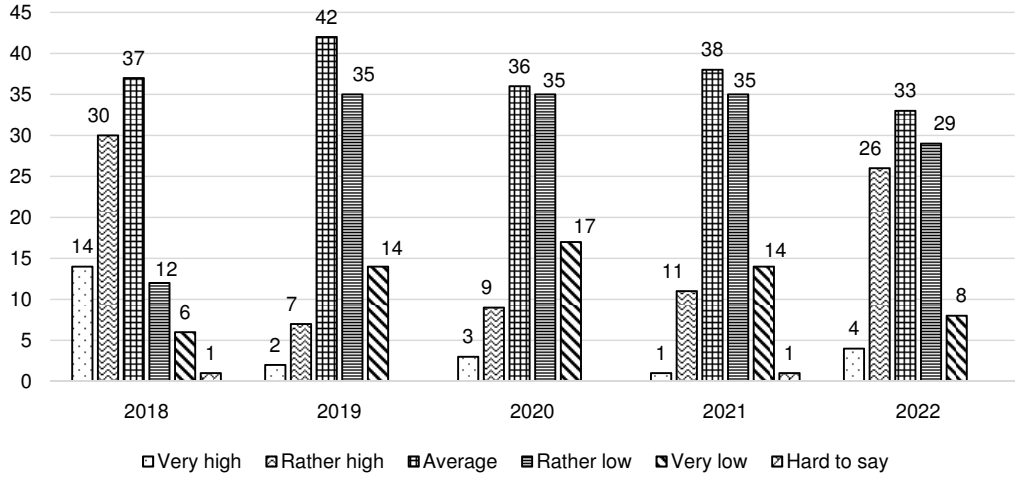
However, when creating financial education programmes, commercial institutions should keep in mind the separation of such activities from financial advisory (Cichowicz, 2016a, p. 132), which will create a better image of such institutions with regard to corporate social responsibility, and could also increase the level of trust placed in banks.

The need for actions in the field of economic education could also be substantiated by a decision of the Polish government, under which starting from 1 January 2022 benefits awarded by the Social Insurance Institution are paid out to service beneficiaries in cashless form as default, to a bank account specified by service beneficiaries – Journal of Laws 1998 No 162 item 1118, Article 130 (Act of 17 December…, 1998). This could be viewed as an element of the government's fight against the financial exclusion of a part of Polish society. However, unless those citizens are educated on how to use banking products, and their awareness of risks and opportunities is enhanced, there is a risk that when such people receive such a benefit they will withdraw all the funds and continue to use cash, thus choosing self-exclusion. Such people could also be categorised as a marginally banked population, given the insufficient use of services offered by the banking sector (Barr, 2004, p. 130).

Self-assessment of knowledge about the personal finances of the Poles is regularly surveyed as part of the "Bankers for Education" programme, organised by the Warsaw Institute of Banking, with the results showing that Poles feel that they possess an increasingly higher level of financial knowledge. However, shortcomings in the field of economy and personal finance have been noticeable the whole time (Figure 1), with the 2022 edition showing that the most severe shortcomings were recorded in the area of cybersecurity (51%) and investing (35%) (Związek Banków Polskich, 2022).

[3] Research conducted by Banaś (2022) on a group of persons aged 55–75 demonstrated a strong dependence between the use of the Internet and the use of online banking.

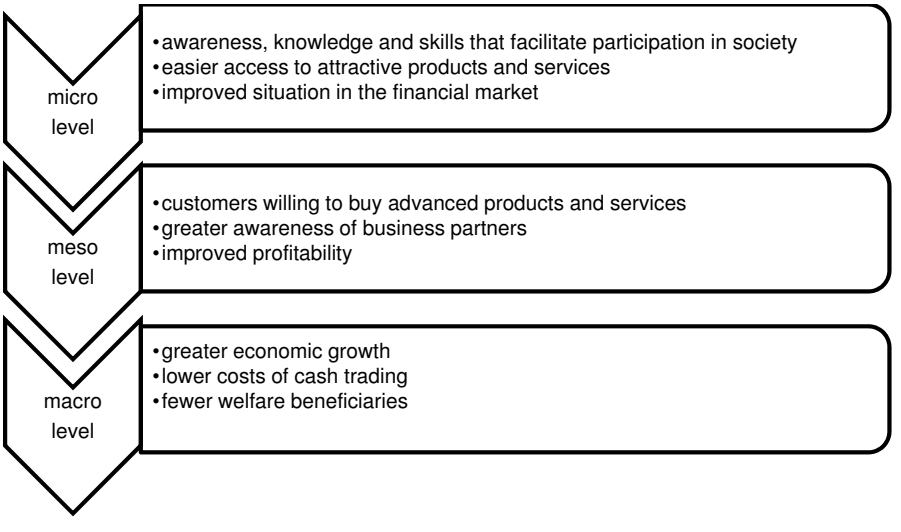
Figure 1
Self-assessment of the level of financial knowledge of Poles (in %)



Source: author's own work based on: *Poziom edukacji finansowej Polaków 2018,* Bankowcy dla Edukacji, 2018 (https://bde.wib.org.pl/wp-content/uploads/2021/08/Poziom-wiedzy-finansowej-Polakow-2018.pdf); *Poziom wiedzy finansowej Polaków 2020*, Bankowcy dla Edukacji, 2020 (https://bde.wib.org.pl/wp-content/uploads/2021/08/Poziom-wiedzy-finansowej-Polakow-2020.pdf; *Poziom wiedzy finansowej Polaków 2022*, Związek Banków Polskich, 2022 (https://zbp.pl/getmedia/e73885ae-2e7d-4a4c-9ca4-e1236e3ae610/Poziom-wiedzy-finansowej-Polakow-2022_ver-medium).

The low level of financial knowledge of Poles is also confirmed by international research[4] conducted by the OECD, and although results for Poland are slightly higher than the overall research average (13.1 points out of 21 total points, with an average of 12.7 points (13 points for the OECD Member States)), it is worth mentioning that further measures to increase the level of financial knowledge of citizens should be taken in all the participating countries. Citizens of Hong Kong, China, Slovenia and Austria ranked the highest (above 14 points), with the lowest scores received by the Italians, Romanians and Colombians, barely above 11 points (OECD, 2020). This confirms postulates arising out of a review of the literature on the subject presented by the author, which demonstrates that economic education should be offered to everyone regardless of the affluence of the country and the social group. The benefits of a society that has received economic education contribute to all aspects of life (Figure 2).

Figure 2
Benefits of a society that has received economic education



Source: author's own work.

[4] Notable domestic publications include papers by Maison (2013) and Rutecka-Góra (2020).

The dynamic changes taking place worldwide were even more accelerated by the COVID-19 pandemic, with modifications also taking place in the financial market. Among others, the limits of cashless payments were increased, and payment habits changed (Banaś & Kliber, 2022), meaning that the economic knowledge from several years ago is becoming outdated increasingly faster. Consequently, such knowledge needs to be sought on a lifelong basis, since new products are more complex and require more extensive awareness.

Economic education as a tool for inclusion

Trychomiak (2021, p. 19) believes that "we should not expect much from financial education". The author of this paper finds such a statement difficult to agree with, as economic education brings benefits, even if not always financial and sometimes difficult to measure, and changes in financial behaviour should be deemed a success of the educational measures. For example, participants of the *Potential – new forms of social capital in the urban municipality of Przasnysz* programme listed the following positive effects: greater awareness of expenditure, hire purchase, and new attempts to find savings. The process of expenditure monitoring presented to the programme participants was also welcomed, with one of the successful outcomes of this activity being the fact that one in ten families began to accumulate savings (Trychomiak, 2021, pp. 21–22), which demonstrates that activities in the field of economic education contribute to a reduction in the level of financial and social exclusion. The opinions of participants pointed to a positive reception, which lets us conclude that activities in the field of economic education are necessary.

It is also crucial that educational programmes are properly adapted, as indicated in research by Lusardi and Mitchell (2007, p. 222) on the awareness of long-term pension saving. The researchers believe that a one-size-fits-all approach has little chance of success, while adaptation of the level and topics to the needs reported will translate into increased effectiveness of training, and although people with disabilities may require special adaptations, such activities will be most likely welcomed. It is worth mentioning the conclusions drawn by Frączek and Gagat Matuła (2019, p. 29) regarding a lack of adapted activities in the field of economic education, as reported by the people affected by Asperger syndrome. The authors of the paper mentioned that such people demonstrate repeatable behaviour, so one could expect that following the process of economic education, such people would become loyal clients of financial institutions. This should translate into a lower share of people affected by financial exclusion, and consequently a lower share of people affected by social exclusion.

From the viewpoint of issues addressed in this paper, it is worth noting the conclusions drawn by Błędowski and Iwanicz-Drozdowska (2010, p. 9), who demonstrated, on the basis of their own work, that "a high level of financial exclusion goes hand in hand with poor knowledge of personal finance". OECD experts drew similar conclusions (2020) and argued that there is a positive correlation between the level of financial knowledge and financial inclusion, which, by analogy, can be understood as a process contrary to financial exclusion. The above-mentioned research demonstrates that it is necessary to stress the need for economic education training for each social group, especially the groups most vulnerable to the risk of financial exclusion. However, financial education not only contributes to financial and social inclusion, and Janc and Warchlewska (2018, pp. 26–27) believe that financial education supports the elimination of factors that are responsible for financial exclusion. A sufficient level of economic knowledge also contributes to an increase in the banking penetration ratio of society, which may translate into the use of more advanced financial products (Świecka, 2016, p. 90). Frączek is more distinct about the consequences of the lack of financial knowledge (2014, p. 125), and claims that it is not possible to effectively manage household finances without knowledge of this type.

A consequence of the financial education of citizens, regardless of their age, is an increase in the prosperity of society (Świecka, 2016, p. 97), while another benefit achieved through economic education is the increase in awareness of individual consumers and the improvement of their situation on the financial market (Frączek, 2014, p. 122). Banks also profit from this situation, as they are able to offer more products to conscious consumers, which contributes to the development of the entire economy.

Summary

A higher level of financial knowledge contributes to greater participation in social processes, while the development of technology, which reduces exposure to geographical exclusion, generates higher digital risk. However, legal determinants, namely the Act on Digital Availability and the increasing share of people who use connected devices, lead to the conclusion that in most cases it is mental factors that contribute to digital exclusion, such as the unwillingness to use electronic banking. The author of this chapter believes that the price of banking services also contributes, to a low extent, to financial exclusion. This conclusion is based on the fact that financial institutions implemented the PAD Directive, which obliged financial institutions to set up basic payment accounts, offered free of charge.

An increase in the level of economic knowledge thanks to a wide educational offer tailored to the needs of participants, who can be treated as partners, will allow financial institutions to win new clients. The research by Żuchowska-Skiba (2020) demonstrated that people with a higher level of disability use the potential offered by the Internet to a greater extent than people with certificates of a lower level of disability. In addition, the Internet allows them to

become more independent and make their own decisions. A pilot poll on economic knowledge among people affected by Asperger syndrome conducted by Frączek and Gagat Matuła (2019, pp. 28–29) points out that even though such people demonstrate repetitive behaviour, they do not use savings products offered by financial institutions, and therefore could be a group of potential clients who would stand out due to their loyalty and the repetitive nature of their behaviour.

Poland still lacks solutions in the field of economic education dedicated to people with disabilities, with such solutions mainly targeted at school and university students, and rarely designed for older recipients. People with disabilities are a highly heterogeneous group and a one-size-fits-all approach cannot be applied to everyone, yet it is worth considering a breakdown into various age groups, such as elementary school pupils, secondary school students, university students, and adults, with dysfunctions obviously taken into account. Age determines participation in the financial market less frequently, because minors increasingly more often hold a bank account, and the elderly also use bank accounts and electronic banking more and more often. It is important that education is offered to all participants in individual groups at a similar level, with integration in mind so that no one feels stigmatised. In addition, the ability to participate in diversified groups may produce different viewpoints, which will be an added value otherwise unobtainable. Frączek and Gagat Matuła (2019, p. 29) also observed that there is a lack of activities in the field of economic education adapted to people affected by Asperger syndrome, which is also confirmed by a report entitled *Map of financial education* (Czernek et al., 2017). As banks obviously operate to make a profit, they design the majority of their educational activities with young people in mind as potential clients. However, the educational activity for people with disabilities should also fit into the framework of widely understood corporate social responsibility, rather than being seen as merely an investment that needs to be profitable.

An increase in the level of economic knowledge is not only beneficial for the people who participate in such activities, but it also contributes to the economy and society, as more aware citizens are less likely to fall into a debt spiral, and they seek welfare less frequently. Well-educated consumers are also more likely to use more advanced products, and the conscious use of products of financial institutions positively affects economic development.

The above assertions prove that economic education should be deemed a tool in combating social exclusion, as an increase in the knowledge positively affects one's self-esteem, which can minimise mental barriers that favour exclusion. The cited research by Błędowski and Iwanicz-Drozdowska (2010) and the OECD (2020) demonstrates that a higher level of financial education prevents financial exclusion, which is linked to social and digital exclusion.

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We recommend

2024 CHLOE 9 Report: Strategy Shift: Institutions Respond to Sustained Online Demand

The ninth installment of the Changing Landscape of Online Education (CHLOE) report, produced by Quality Matters™ , Eduventures® and Educause – offers an overview of the current state of online learning in higher education as well as insights into its future development. The report was compiled by surveying chief online officers (COLOs) – the professionals best situated to assess the current state of this ever-developing field – at U.S. two- and four-year colleges and universities.

The majority of survey participants report both learner demand for online learning surging and institutional strategic priorities shifting to meet this demand, as well as the adaptation to the new presence of AI tools in the academic environment. Notable findings from the 53-page report include:

- **Priorities for Online Learning**: Institutions are increasingly prioritizing the development of online versions of both on-campus courses (69%) and on-campus degrees (65%) in order to meet demand. In terms of their topmost priority, 43% of COLOs chose online versions of on-campus degrees (the majority of public four-year institutions identified this as their top priority), with online versions of on-campus courses selected as the top priority by 39%.
- **Tuition and Institutional Revenue**: In an era when many institutions are experiencing financial challenges, most COLOs surveyed reported that their institutions charge the same tuition for online learning as they do for traditional face-to-face learning. With 60% of four-year public institutions reporting that they generate net revenue from these programs, the data points toward a high degree of financial viability for online learning. As a result, many institutions are investing more deeply in their online programs: 42% of COLOs reported at least some increase in their online learning budget.
- **AI in Higher Education**: With artificial intelligence a constant topic of discussion in education, COLOs reported a wide variety of approaches for addressing its presence and potential in higher learning. Only 35% of COLOs reported having AI-related policies; 40% reported that policies and guidelines related to AI were topics under discussion. 34% of COLOs reported that students are encouraged to engineer AI prompts in their classes, and 32% of COLOs say that AI as a topic is taught to students. Only 6% of COLOs said students are actively discouraged from using AI.
- **Third-Party Servicers**: In early 2023, the U.S. Department of Education announced new accountability measures for Third-Party Servicers – corporate entities that partner with colleges to help them develop or deliver some aspect of their operations – including Online Program Management companies (OPMs). These measures greatly expanded both the definition of this category and the actions institutions must take in order to utilize Third-Party Servicers, raising concerns about the time and cost needed to comply. In CHLOE 9, about a quarter of COLOs reported that their institution currently works with at least one OPM, an increase from the 18% who said the same in CHLOE 7 (2022). This suggests that OPM adoption by institutions invested in online learning is still growing. Just over half of respondents revealed moderate or little concern about newly proposed federal regulations targeting OPMs and other online learning activities, suggesting widespread uncertainty about whether proposed new rules will ever take effect.
- **Regular and Substantive Interaction**: In order for online courses to qualify for federal student aid, the U.S. Department of Education requires Regular and Substantive Interaction (RSI) to occur. This requirement mandates frequent and meaningful interactions between students and instructors in both synchronous and asynchronous programs. In CHLOE 9, only a small minority (7%) of schools report not having (or considering) RSI policies or guidelines, with public institutions more likely to have them than private institutions. The majority of institutions provide faculty support in meeting RSI by providing staff help, training, and/or digital resources, but nearly one-quarter do not evaluate any courses to determine if RSI requirements have actually been met.

From the official Quality Matters website, the report can be downloaded for free at: **https://www.qualitymatters.org/qa-resources/resource-center/articles-resources/CHLOE-9-report-2024**

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New tool supporting teachers in designing online interactive content – lessons learned from experiences in Poland, Italy, Bulgaria, Greece and Sweden

Abstract

Restrictions related to the COVID-19 pandemic forced universities and teachers to switch from face-to-face to online teaching, which required adopting solutions for numerous organisational and technical challenges. In this context, the aim of this study is to highlight issues faced by teachers during the COVID-19 pandemic, show e-learning solutions developed as part of the iSurvive project, and assess their usefulness in online teaching. In the research conducted in 2021–2023, challenges with online teaching and learning were identified, a handbook with important advice for online teaching was prepared, an interactive & gamified online content search engine was created, and training for academics was prepared and conducted. Students, academic teachers and relevant experts in the field of e-learning from four European countries took part in the quantitative and qualitative research and training. A unique outcome of the project was the creation of e-learning applications, catalogues and content maps stored in one place, which proved their innovation and adoption to the needs of an unstable and unpredictable world, and received positive feedback.

Keywords: online tools, e-learning, open source, MOOC, EU project

Introduction

On 13 March 2020, a total of 61 countries worldwide announced the closure of schools and universities, following the official announcement of the start of the COVID-19 pandemic by the World Health Organisation on 11 March 2020 (Ciotti et al., 2020). Despite adopting preventive social distancing policies, the need to protect the youngest groups from the rapid contagion of the disease led to a total disruption in the delivery of school and university education, moving from 'traditional' face-to-face teaching to online learning (Jandrić et al., 2020; Mseleku, 2020).

The COVID-19 pandemic measures incentivised 'distance learning' in order to ensure the continuity of education, with school administrators and teachers consequently facing the task of changing traditional teaching paradigms for the duration of the suspension of teaching activities, during which they had to organise 'virtual classes', paying attention to the specific needs of students. The transition from face-to-face teaching to e-learning represented, on the one hand, a great opportunity to adopt a more flexible, widespread and interactive approach, while, on the other hand, it highlighted many disadvantages and challenges, such as the absence of face-to-face interactions and the lack of physical proximity to classmates. This sudden process also found both teachers and learners to be unprepared to deal with digital teach-

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ing, partly due to a lack of digital skills and partly due to objective challenges related to technological infrastructure (Hassan, 2021; Ochnio et al., 2022; Simamora et al., 2020).

To make up for the technological gaps, many institutions set up valuable resources for teachers and students, such as webinars, multimedia materials, tools for cooperation and the exchange of good practices, communities, etc. There was a significant increase with dynamic evolution in the supply of services and tools to support digital teaching, such as e-learning platforms for course delivery, digital reference for user assistance, web conferences for virtual meetings, web tools for creating digital lessons, live lectures and virtual classes, etc. (Alam, 2022). The process was two-pronged. On the one hand, institutions independently tried to solve these problems, while on the other, government and international institutions supported the creation of remote learning tools. One such institution supporting modern e-learning solutions was the Erasmus+ programme, as part of which a consortium of experts drew attention to the potential and issues with online teaching, providing a new tool to train and support teachers in designing effective interactive online content.

The study therefore aimed to present the issues with teaching during the COVID-19 pandemic, e-learning solutions developed as part of the iSurvive project, and their usefulness in online teaching. The main research questions were as follows: how can we accelerate the process of transferring traditional courses into online courses to help teachers during unstable times, such as the pandemic; how can we respond to the needs of academic teachers so that they can quickly learn the intricacies of e-learning?

Literature review

Education has always been greatly influenced by the rapid development of technology. E-learning is a synonym for online learning, and relates to delivering educational services using information and communication technologies. Initiated in the 60s, based on framework computers (Brika et al., 2022), some researchers also consider it a successor of mail correspondence courses that were the first form of distant learning. In the 90s learning management systems (LMS) became popular, with Moodle being a widely used example of an LMS (Kruse et al., 2023).

The first decade of the new century saw the birth of Massive Open Online Courses (MOOC). MOOCs were offered for the first time in 2012, when technological companies and leading universities, both in the US and Europe, created technology platforms that simultaneously allowed many courses to target very different audiences (McAuley et al., 2010; Weller, 2014). Few universities included MOOCs in their regular programmes, with the courses addressing access, affordability and efficiency in education (Slavova, 2017). While due to time and expense constraints the dissemination of MOOCs was not as successful as expected, the COVID-19 pandemic renewed the interest in them.

There are many terms used to describe the e-learning process or some of its aspects. According to Kumar Basak et al. (2018), D-learning is the most general term that signifies the usage of technologies for learning, while e-learning is the educational process supported by using electronic tools and media mainly via the internet. Another aspect is synchronous learning as simultaneous interaction between educators and those educated and the asynchronous learning process – learners study the teaching materials by themselves (Moore, 2012).

There are various reasons for e-learning development. Some universities use it to reach students in remote areas or attract international students. Today e-learning is an integral part of the educational process developed in different constructs, using various interactive multimedia resources and improving the learning experience. One of the most common open-source learning and management platforms used all around the world for e-learning is Moodle (Alkhateeb et al., 2010, Alonso de Castro & García-Peñalvo, 2021, Meriem & Youssef, 2020, Ntshwarang, 2021, Qazi et al., 2021, Țurcanu et al., 2020). The need for innovative e-learning tools, training and new technologies gains significance especially during the unstable conditions of constant shocks (pandemics, conflicts, political instability, etc.). Teaching and learning through innovative teaching tools instead of traditional education remains challenging. Hence, tutorials and motivation programmes for ICT-based learning can remove ICT-based learning deficiencies and improve the outcome quality and success rate (Qazi et al., 2021). The evolution of web and computer-assisted learning and the current directions in e-learning applications are hybridisation, modularity, standardisation and integration (Rogerson-Revell, 2007).

The COVID-19 pandemic restrictions had an immense impact on the development of e-learning and contributed to its enhancement (Mahmud et al., 2022). The lack of training, working conditions, technological background, skills, copyright protection and professional development are important factors in implementing e-learning in public universities (Maatuk et al., 2022). Turnbull (2021) identifies five challenges to transitioning to online education experienced by higher education institutions: synchronous/asynchronous learning tool integration, access to technology, faculty and student online competence, academic dishonesty, and privacy and confidentiality.

During the COVID-19 pandemic, the vast majority of universities faced the same challenges. They had various technical problems, including low-quality Internet services in that country, with many students facing challenges in adopting to technology (Al-Balas et al., 2020). In some universities, despite students' positive attitudes towards the e-learning approach, the university's management did not encourage teachers to implement ICT in teaching due to concerns about limited resources and lack of competen-

cies (Asad, 2021), with some students expressing discomfort in using the newly introduced e-learning platforms (Kaushik & Agrawal, 2021). Marunevich et al. (2021) stress that despite the adoption of various e-learning and m-learning interactions, such as social networks and video conferencing, both students and teachers lacked familiarity with these platforms due to inadequate training and the unexpected shift to online learning during the COVID-19 pandemic. Ongoing investments in faculty training to use online platforms could help maintain high-quality university programmes, especially during unstable times such as pandemics, crises, conflicts and natural disasters.

The COVID-19 pandemic exposed the different readiness levels of universities and lecturers to adopting e-learning approaches and tools. It turned out to be a greatly challenging to take advantage of the variety of teaching approaches that already existed or started to diversify very quickly, with academics needing guidance in the adoption of suitable tools congruent with their course objectives. This process often entailed trial and error, notwithstanding the substantial efforts by university administrations to assist them in accessing diverse platforms. The amount and variety of e-learning tools made it challenging for the instructors to choose appropriate ones tailored to their courses' needs. Teachers required catalogues, content maps and guides that conveniently showed each tool's advantages and limitations. The iSurvive project constitutes a response to the problems that emerged during the COVID-19 pandemic, and the creation of such catalogues and content maps serves the novelty of the project and proves its innovation and adoption to the needs of an unstable and unpredictable world.

The iSurvive project description and methodology

In the aftermath of the COVID-19 pandemic, many academics and teachers had to switch from face-to-face to online courses and classes. Many teachers were already aware of the e-learning concept and its tools, but due to the COVID-19 pandemic appearing so unexpectedly, neither teachers nor students were prepared for such a sudden change. For many academics and teachers, their initial response to this change was just to create a virtual meeting room for students by just sharing PowerPoint presentations. The iSurvive project came as a response to this pandemic crisis, and was developed to provide academics and teachers with all the necessary knowledge and tools to prepare them to provide their students with a full and comprehensive pedagogical experience. The project was designed to enhance the teachers' knowledge about the online teaching concept and also provide them with the necessary tools enabling them to deliver their classes more efficiently and deliver first aid in the quick transfer of classes.

The project, which started in June 2021 and ended in May 2023, gathered 7 partners from Europe, represented by the following organisations: SGGW (Poland), UNWE (Bulgaria), CRES (Italy), UNINETTUNO (Italy), FU (Sweden), ITPIO (Bulgaria). The following tasks can be distinguished in the project lifecycle:

1. Comparative study – identifying the challenges in online teaching and learning,
2. A guide of key pedagogical principles for effective online teaching and learning creation,
3. The iSurvive compass for interactive & gamified online content creation,
4. MOOC training – a library with 40 tools collected, described and catalogued.

The goal of the first task was to diagnose the challenges teachers faced when they quickly and suddenly transferred to online classes. The diagnosis was performed from the perspective of the student (questionnaires) and the teacher (questionnaires and focus groups), with some 809 students and nearly 50 teachers participating in this stage (Table 1). The research was carried out from September to December 2021, with qualitative and quantitative analysis conducted to study the previously mentioned gap based on the

Table 1
Sample sizes in each step of the project

Stage of the project	Type of activity	Number of participants
Comparative study	Student questionnaire	809
	Teacher questionnaire	48
	Focus groups	22
The guide	Focus groups	17
	External reviewer opinions	10
iSurvive compass	Teacher/lecturer pilot training (questionnaires)	75–100
	External expert opinions	10
MOOC	Teacher/lecturer pilot training (questionnaires)	75–100
	Teachers' opinions after use for own classes preparation	35
	External expert opinions	10
	External reviewer opinions	10

Source: authors' own work.

responses of the direct target groups (academics and teachers) and the indirect target group (students). This analysis illustrated a set of challenges faced in the online teaching process (Ochnio et al., 2022), with the results of this task taken into consideration in the future steps, and the remaining project's outcomes built based on the conclusions of this task.

In the second task, a 120-page handbook including the most important tips for online teaching was written. A search engine, called the iSurvive compass, was designed in the third step. Within the last task, MOOC training was performed, providing the teachers and academics the information needed to use the available online teaching tools, and a quantitative analysis of trained participants' satisfaction was conducted. The surveys aimed to assess the usability of the developed iSurvive compass and determine whether the knowledge and awareness of e-learning tools among the trained-academic teachers had increased. The usability of the provided tools was also assessed by external reviewers (experts in e-learning). The MOOC is designed on the Moodle platform, with numerous users already registered to the courses (over 350).

The iSurvive project results – intellectual outputs presentation

A guide of key pedagogical principles for effective online teaching and learning

As part of the project's output, a guide was prepared for academic teachers who wish to transform their face-to-face courses into online courses or enhance their classes by incorporating attractive technological solutions. The guide aimed to equip academic teachers with specialised pedagogical knowledge, useful tips, and practical know-how necessary for creating effective online classes and considering the diverse learning outcomes, outlining the fundamental steps required to create an online course. The online book describes various types of technology for conducting online classes, such as interactive tools like applications, engaging presentation software, educational games, etc, outlining the fundamental steps required to create an online course, develop a subject syllabus, build interactive modules, and present effective utilisation of tools for preparing online classes and designing MOOC courses. The guide also addresses issues related to student motivation, classroom management strategies, working in an intercultural environment, and provides insights into student assessments and online course evaluation (https://www.isurviveproject.eu/).

iSurvive compass – the tool

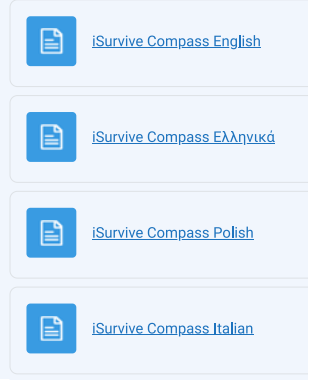
The iSurvive compass for interactive & gamified online content creation constitutes the "hand on" tools needed to create interactive and gamified content. Most of the academics do either not have enough time to search, choose and learn all of the tools to make their content interactive and motivating, or they find some tools that seem useful and use them regardless of whether they are the correct ones for their target group, disciplines, class duration etc. This task aimed to create an inventory with appropriate technology tools for interactive content Creation and SCORM (Sharable Content Object Reference Model) by using open online resources. For teachers and academics to obtain easier access to various tools, an algorithm was prepared to provide the teachers with an orientation tool. The compass is available in numerous languages (a fragment of the site is presented in the Figure 1a). An interactive survey that answers simple questions about the lectures or the institution is used for accessing a specific subgroup of the resources collected (Figure 1b).

The full list of questions in the survey is as follows: videos, presentations, recorded/live meetings, quizzes, interactive tasks (tests, case studies), gamifications, didactic games, competitions or contests (rivalry), interactive elements (e.g. animations).

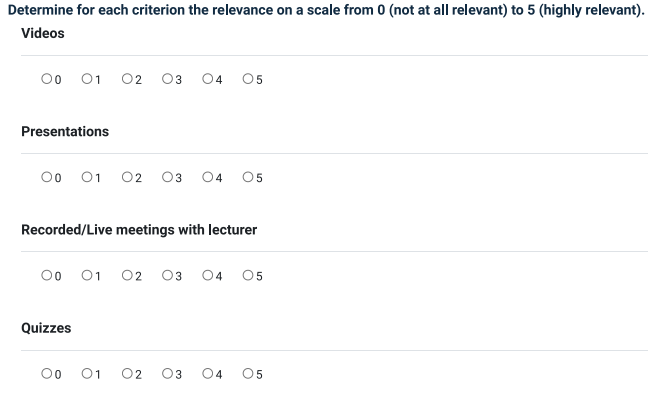
Figure 1

iSurvive compass (a) with an interactive survey (b)

a)



b)

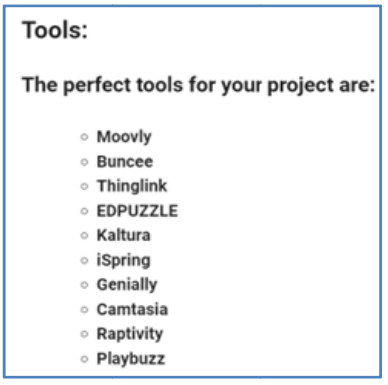


Note. The picture shown on the Figure 1 is available after enrolment to the course.

Source: iSurvive (https://isurvive.projectlibrary.eu/).

For each criterion teachers determine the relevance of the tool they are searching for on a scale from 0 (not at all relevant) to 5 (highly relevant). The compass displays a list of dedicated tools selected for specific needs according to the relevance indicated in the survey. Figure 2 presents the answers for a chosen questionnaire. The list of the chosen applications generated by the compass calculated the best fitted tools for the user's needs.

Figure 2
The interface of the questionnaire results of the iSurvive compass



Note. The picture shown on the Figure 2 is available after enrolment to the course.

Source: iSurvive (https://isurvive.projectlibrary.eu/).

The project also foresaw a piloting phase of results tested and evaluated by the project partners in their countries to assess the suitability, reliability and quality of the tools developed within the project, as well as to provide recommendations for further improvements. The piloting aimed to assess the feasibility and impact of the educational technology tool in a real classroom context, and to gather feedback from participants to identify areas for improvement and potential modifications to the outputs produced. Indicatively, the iSurvive compass, the guide and the library were tested by a total of 100 school teachers and university lecturers.

Feedback from the trainees was collected during and after the piloting stage. Two external reviewers per country, specialised in e-learning, were asked to share their opinion about all the project outputs, which are the guide, iSurvive compass and MOOC. The reviewers graded chosen criteria from 1 to 4, where 1 was insufficient and 4 was excellent, assessing areas such as the usability and flexibility of the tools (intuitiveness, graphical layout - i.e. visually appealing, attractive, eye-catching), technical quality of the tools, comprehension of languages and texts (the language of the tools, the accuracy of descriptions), and overall satisfaction, and could freely add other suggestions.

Evaluators primarily assessed all the areas in grade 4, with occasional evaluations in grade 3, along with providing additional comments. Overall, the opinions received were very positive, and satisfaction with the project was rated as excellent. The novelty of the proposed solution is much appreciated in a rapid changing environment, where academic teachers have no time to transfer their classes from traditional to online versions.

Regarding the iSurvive compass recommendations, they exceeded the project scope but are considered crucial for future development. Teachers and academics highlighted the potential of the iSurvive compass and MOOC in enhancing student engagement, resilience and learning outcomes, and strongly recommended continuing the development and iteration of the iSurvive compass and MOOC.

According to experts, further refinements should be made in the iSurvive compass to include customisation options, such as users should having the ability to apply filters to select specific criteria, such as tools with free access. The roadmap in the iSurvive compass algorithm should print the tools that cater to teachers' needs, and it could be beneficial to rank the suggested tools indicating the three most essential tools as the primary options, with the rest as recommended as secondary choices.

MOOC training

As a result, the outcome of the last project was a MOOC training designed to equip teachers and academics with the necessary knowledge to effectively utilise the available online teaching tools. Within this MOOC, the tools are categorised based on learning methods, with each method concisely explained, and a curated set of online tools corresponding to each method presented. Each tool is comprehensively described, ensuring that teachers and academics can easily access all the information and links required to initiate the use of the tool.

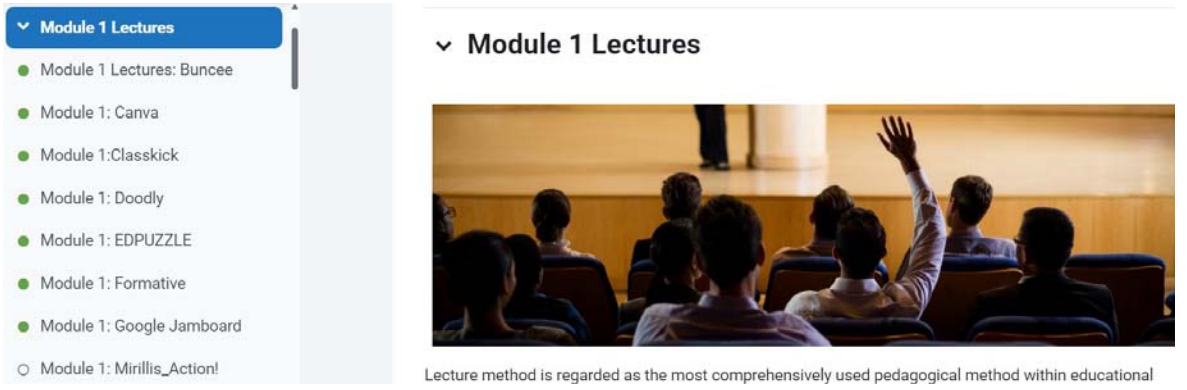
In order for the university lecturers and academics to successfully use the tools for interactive and gamified content creation developed as part of the roadmap for their courses, they needed to receive training, which was provided as an online course in the form of a MOOC. The MOOC course created within the project constitutes interesting and interactive tutorials for all the tools included in the created databank. The course is accessible on the Moodle platform after registration.

Each trainee/project beneficiary can explore all the tools or select those relevant to their specific needs as indicated in their individualised roadmap provided by the iSurvive compass application integrated into the Moodle platform. The tools are all presented as separate modules (Figure 3) that can be separately trained.

The MOOC describes a total of 40 tools, categorised into seven groups, with each dedicated to specific tasks such as lectures, laboratories, tests, competitions, teamwork, didactic games, etc. The course offers insights into the tools, tutorial links, available languages, pricing plans, and registration procedures (see Fig 4), which is very helpful for the teachers when the compass show them a first list, in order to quickly

Figure 3

MOOC course with type of classes modules



Note. The picture shown on the Figure 3 is available after enrolment to the course.

Source: iSurvive research (https://isurvive.projectlibrary.eu).

obtain access to the online tools and learn more about them, e.g. whether there are translated versions or where video instructions are available etc.

Additionally, as part of the project outcomes, the conducted training sessions were evaluated, with 100 teachers trained and 71 responses received from the questionnaire. All participants expressed that the training was either useful or very useful, with the information provided seen as relevant to online learning. Before the training, only 43.7% of participants reported having access to e-learning tools, while following the training all participants indicated a lack of issues with accessing such tools. Furthermore, familiarity with e-learning tools demonstrated a significant increase (Figure 4, left diagram). Before the training, 53% of participants stated that they were familiar with only three or fewer tools, while following the training only 10% of teachers fell into this category, with the majority (68%) declaring that they were acquainted with at least seven e-learning tools. Moreover, knowledge about specific tools dedicated to preparing lectures, tests, group classes, or classes with gamification elements also saw a notable improvement. As a result, the comfort level of teachers conducting online classes significantly improved (Figure 5, right diagram).

We applied the two-sample t-test to check whether the iSurvive projects results led to significant enhancement of lectures' knowledge and comfortability with using online teaching tools, and verified the null hypothesis that the project results do not have any impact on lectures' comfortability with using online teaching tools and the number of tools they know. The results of the one-sided t-test indicated that, at the significance level of $\alpha = 0.10$, the average number of people who answered that they did not feel comfortable with online teaching was statistically significantly greater before the implementation of iSurvive courses than after them ($t = 2.01$, *p-value* $= 0.057$; H_1: $\mu_{BEFORE} > \mu_{AFTER}$). Moreover, the test results revealed that the the average number of people who answered that they felt comfortable with online teaching was statistically significantly greater after the implementation of iSurvive courses than before them ($t = 1.55$, *p-value* $= 0.097$; H_1: $\mu_{AFTER} > \mu_{BEFORE}$). Additionally, the results of one-sided t-test showed that the average number of online tools that the survey participants' knew was significantly

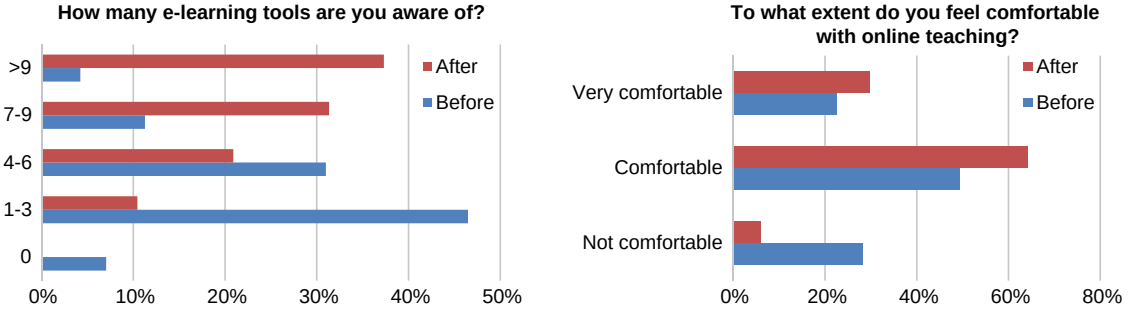
Figure 4

Exemplary content of the MOOC course

Note. The picture shown on the Figure 4 is available after enrolment to the course.

Source: iSurvive research (https://isurvive.projectlibrary.eu).

Figure 5
Selected results of surveys conducted before and after the training



Source: authors' own work based on iSurvive research.

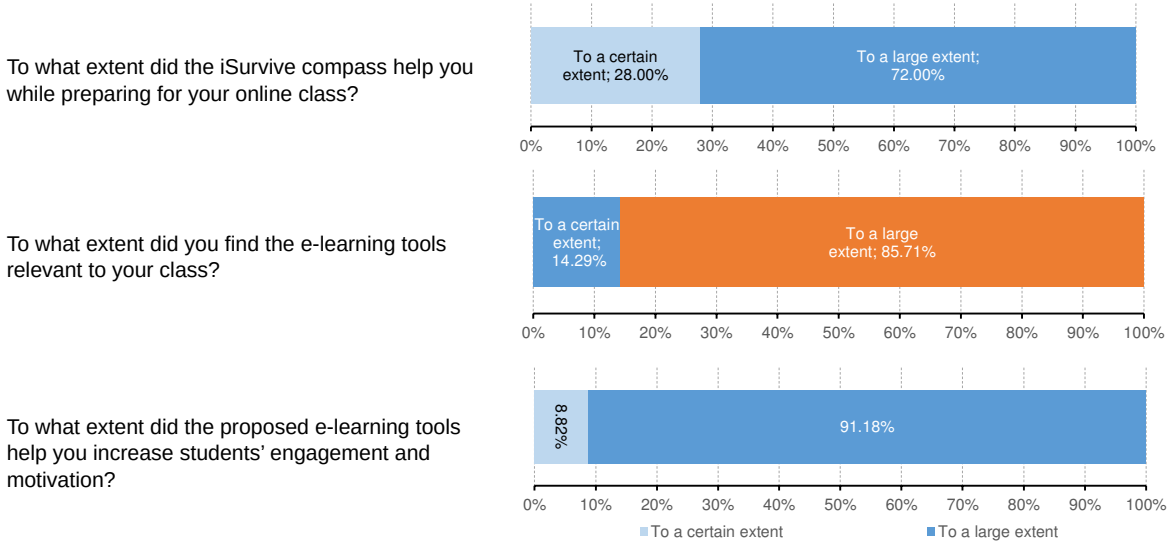
greater after the iSurvive course) ($t = 2.116$, *p-value* $= 0.062$; $\mu_{AFTER} > \mu_{BEFORE}$).

The piloting results were highly significant for obtaining a comprehensive overview of the current state of digital competencies within the educational community, and for refining and expanding the project's covered tools. According to the survey questions, prior to the piloting many online learning tools were unfamiliar to the participants, who were uncertain about which tools to use for preparing online tests and exams. All participating organisations also prepared a report from the training, where they stated that all trainees acknowledged that independently discovering, testing and learning how to use tools was time-consuming, while nearly half of them were not acquainted with tools supporting the preparation of online lessons with educational game elements before the piloting. According to the participants' comments during the training, they particularly appreciated the interactive nature of the online tools, although some found it restrictive that certain tools were fee-based or required user registration.

Following the piloting, the survey and comments indicated that the majority of participants were satisfied with the event, found it extremely useful, and deemed the received information as relevant to their work, additionally expressing their intention to incorporate the acquired e-learning knowledge and tools into their online classes. All the participants increased their familiarity with a greater number of tools, and improved their awareness and ability to select the most suitable tools for their classes, which they pointed to in the survey.

Five teachers from each country, with the exception of Greece, where there were 15, actively utilised the developed tools in practice (35 teachers in total), and were subsequently requested to provide their feedback on the experience. Nearly two-thirds of the respondents reported that the e-learning tools from our project significantly assisted them in preparing online class content, with especially the iSurvive compass proving to be highly beneficial in aiding teachers during the preparation process for online classes (refer to the responses shown in Figure 6).

Figure 6
Evaluation of the iSurvive compass by teachers



Source: authors' own work based on iSurvive research.

Furthermore, the evaluation results indicate the necessity to ensure easy access for teachers to the MOOC link. To achieve this, we should aim to minimise the number of clicks required for accessing the MOOC, for instance by presenting the list of recommended tools generated by the iSurvive compass as hyperlinks, redirecting teachers to the specific tool presentations on the MOOC's page. Additionally, the MOOC should be regularly updated to incorporate new solutions, prices and possibilities, and the database in general should be gradually expanded to encompass the full spectrum of available tools.

Discussion

There is a great need for innovative e-learning tools, training and new technology especially during the unstable conditions of constant shocks (pandemics, conflicts, political instability, etc.), and teaching and learning through innovative teaching tools instead of traditional education styles remains a challenge. The COVID-19 pandemic exposed the difference in readiness levels of universities and lecturers to adopt e-learning approaches and tools (Al-Balas et al., 2020; Asad, 2021; Marunevich et al., 2021), with academics needing guidance to adopt appropriate tools corresponding to the course goals. The extensive choice of e-learning tools created problems for the instructors to choose appropriate ones tailored to their courses' needs, with teachers requiring catalogues, content maps and guides conveniently showing the advantages and limitations of each tool. The iSurvive project constituted a response to the challenges present at that time, as there had previously been no such tool. Its creation therefore proved to be a novelty in the project results.

Nwagwu (2020) and Ţurcanu et al. (2020) highlight the necessity for additional investments in e-learning. Alqahtani and Rajkhan (2020) and Hartshorn and McMurry (2020) emphasise the importance of adequately preparing teachers and students for the online teaching process, underscoring the necessity of creating suitable training materials in this regard, and numerous textbooks and manuals have been developed, detailing specific e-learning tools utilised in education. However, what sets the iSurvive project apart is its facilitation of the creation of a compass/map, enabling lecturers to select various e-learning tools tailored to their educational needs, assessment format and course content. In the future, such a tool could be further refined with proper implementation of artificial intelligence, as it appears that the advancement of artificial intelligence will be immensely beneficial in the innovative and efficient development of online teaching tools (Arun Kumar et al., 2022).

Conclusions and recommendations

The aim of the study was to present teaching challenges during the COVID-19 pandemic, e-learning solutions developed as part of the iSurvive project, and their usefulness in online teaching management. The surveys and in-depth focus studies confirmed numerous issues related to transitioning from traditional teaching to distance learning, with students' satisfaction with online classes and their attractiveness significantly depending on the field of study, potentially indicating the need to differentiate the tools applied. Interactive content and interesting design of the courses and quizzes were listed among the most motivating techniques in online learning. Teachers also confirmed that passive online education should be avoided, to be replaced by interactive solutions . Research indicates that the preferred future learning model is based on blended classes with around a 50% share of traditional and online courses.

For successful e-learning, it is crucial to understand the technical, psychological and social aspects of distance learning. As part of this project, we prepared a guide covering the key pedagogical principles for effective online teaching and learning, equipping academics and teachers with the necessary information and knowledge for creating effective online classes. Its content, which covered the fundamental steps required to create online courses and knowledge about pedagogical competencies, was positively received by teachers and experts.

Academic teachers expressed that they often faced challenges in finding enough time to search, select and learn various tools to make their content interactive and engaging. The iSurvive compass tool was developed to address this need, facilitating the selection of the most appropriate e-learning tools for diverse classes and teaching activities. To effectively implement the iSurvive compass tool, 40 e-learning tools were organised into specific groups, with interactive tutorials created for each category. The resulting MOOCs, available on the Moodle platform, were utilised in piloting and training activities. Following the training sessions, all participants reported having found the training to be either useful or very useful, with the information provided being highly relevant to online learning. As a result of the training, the participants significantly increased their familiarity with e-learning tools. Their knowledge of specific tools dedicated to preparing lectures, tests, group classes, or incorporating gamification elements also notably improved, with nearly two-thirds of the teachers who experienced the digital roadmap and the MOOC indicating that the e-learning tools from the project had greatly assisted them in preparing online class content. Furthermore, all participants demonstrated increased proficiency in knowledge of the tools, encompassing the number of tools they were aware of and their ability to select the most suitable ones for their respective classes.

Based on the project results, several recommendations can be put forth. Firstly, in order to practically utilise the tool developed within the project, there is a need for extensive dissemination and promotion of the platform to ensure accessibility to the target group. Additionally, constant updating and incorporation of feedback from users and experts is essential to enhance

its effectiveness. Furthermore, the COVID-19 pandemic underscored the importance of active efforts by governments and international institutions to address the adverse impacts of global shocks. Consequently, closer cooperation between educational institutions, fostering economies of scale, is also highly recommended.

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The full list of references is available in the online version of the journal.

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Sidiropoulos Dimitrios

Guidelines for preparing a successful Erasmus+ proposal

Abstract

The aim of this article is to provide a comprehensive guide to writing a successful European Erasmus+ project proposal, which, in order to be accepted and receive funding, should meet several key criteria, including project design, progress monitoring, deliverable development, result dissemination and sustainability. Each aspect should be meticulously detailed, with clearly defined and attainable goals, a distinct methodology and strategic planning for implementation. The proposal should also be original, addressing contemporary issues relevant to the European community and beyond, as well as practical and feasible, and without exaggeration. This article offers insights and guidelines on these critical aspects, drawing from European Commission directives, the outcomes of previous Erasmus+ projects and extensive prior experience.

Keywords: European project, Erasmus+, project dissemination, Erasmus guidelines, project sustainability, project evaluation, project monitoring, project life cycle

Introduction

Before planning and managing a project, it is essential to define what constitutes a project itself. A project is a series of activities and tasks aimed at resolving a specific issue by achieving clearly defined objectives within a set timeline and budget, and should involve clearly identified stakeholders, well-defined coordination, management and financial arrangements, as well as a monitoring and evaluation system. Importantly, the benefits of the project should outweigh the costs. Project development can vary significantly in terms of objectives, scope and scale, but effective project cycle management systems adhere to standard working modalities and rules. Effective project management ensures that objectives are met efficiently, risks are mitigated, and stakeholders' expectations are fulfilled, leading to successful project completion (European Commission, 2005).

Writing a comprehensive Erasmus+ proposal is a complex process requiring careful planning, methodology and strategy to achieve the desired results, and it is crucial to closely follow the instructions of the European Commission and National Agencies (e.g. the Foundation for the Development of the Education System (FRSE), https://www.frse.org.pl, Poland, and The State Scholarship Foundation (IKY), https://www.iky.gr, Greece), paying careful attention to the annual changes in the online application guidelines. Familiarity with key concepts and tools is essential for crafting an attractive proposal, including understanding the project life cycle, conducting a needs analysis and ensuring effective monitoring, evaluation and sustainability of the project. The above steps are all very important and should be fully understood by the funding applicant in order to increase the chances of project approval. This article explores these concepts in detail and provides specific examples to help organise and enhance the project proposal.

Erasmus+ project Key Actions

As a starting point, it is important to have thoroughly studied the relevant grant proposal guides, terms, deadlines and proposal eligibility, and to have defined the aims and objectives in order to decide which programme meet the needs of the applicant organisation (https://erasmus-plus.ec.europa.eu/programme-guide/part-b). The Erasmus+ programme essentially offers three key actions, i.e. Key Action 1: Learning Mobility of

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Individuals, Key Action 2: Cooperation among organisations and institutions, and Key Action 3: Support to policy development and cooperation. Each action serves specific purposes and aims at strictly defined results. As stated on the European Commission's website, the three basic actions support:

Key Action 1 of the Erasmus+ programme centres on the Learning Mobility of Individuals, aiming to achieve profound impacts on participants, organisations and educational policies. For learners, including students and youth, the initiative enhances learning outcomes, employability and intercultural competences, fostering a deeper engagement with European values and encouraging continued education. Educators and professionals benefit from enhanced competences, international perspectives and improved capacity to innovate within their institutions. Participating organisations experience increased international operational capabilities, improved project management, and enhanced community engagement through innovative educational practices. Overall, Key Action 1 is poised to catalyse systemic changes in education and training across Europe, driving policy reforms and enhancing mobility opportunities amidst current socio-economic challenges, such as supporting individuals affected by conflicts, such as the Ukrainian crisis (https://erasmus-plus.ec.europa.eu/programme-guide/part-b/key-action-1/key-action-1-learning-mobility-of-individuals).

Key Action 2 of the Erasmus+ Programme focuses on promoting cooperation among organisations and institutions through various partnerships and capacity-building projects, which aim to foster innovation and enhance practices in education, training, youth and sport sectors at local, regional, national and European levels. By supporting partnerships for cooperation, excellence and innovation, as well as capacity-building projects, this Key Action seeks to modernise education systems, improve internationalisation strategies, and strengthen organisational capacities. Projects under Key Action 2 are expected to yield outcomes such as enhanced employability, increased digital competences and greater social inclusion, as well as align education and training systems with the needs of the labour market, promote diversity and inclusion, and advance civic and intercultural competences. Ultimately, Key Action 2 aims to contribute to the overall quality and accessibility of education and training across Europe, fostering a more integrated and responsive approach to addressing contemporary societal challenges (https://erasmus-plus.ec.europa.eu/programme-guide/part-b/key-action-2).

Key Action 3 of the Erasmus+ Programme aims to support policy development and cooperation across the European Union in education, training, youth and sport, facilitating the implementation of EU policies and fostering the creation of new reforms and modernisation initiatives at both national and EU system levels. Key activities include promoting policy experimentation, gathering evidence on education and training systems, enhancing transparency in skills recognition and qualification transfer, and fostering dialogue with stakeholders through conferences and events. Additionally, it aims to improve programme implementation by facilitating knowledge transfer among National Agencies and supporting the scaling-up of successful projects. Key Action 3 plays a crucial role in promoting the Erasmus+ programme and EU policies, aiming to raise awareness and disseminate best practices at local, national and European levels (https://erasmus-plus.ec.europa.eu/programme-guide/part-b/key-action-3).

Project Life Cycle Management Approach

To outline the process through which projects are developed, designed and managed, it is essential to introduce the concept of Project Cycle Management (PCM). PCM is a systematic and structured approach used to plan, implement, monitor and evaluate projects, serving as a guiding framework that ensures projects are effectively managed from start to finish, leading to improved efficiency, enhanced outcomes and increased chances of success. PCM encompasses a series of interrelated phases enabling organisations and project managers to navigate the complexities of project development and execution (Dalla, 2020).

PCM can also be viewed as a set of tools for managing community-funded initiatives, including volunteer-funded programmes, by overseeing the life cycle of a project. Introduced by the European Commission in the 1990s, PCM aimed to address the negative evaluations by the Development Cooperation Directorate of projects implemented in the 1980s (European Commission, 2005). The applicant organisation's project team should definitely start using the Project Life Cycle Management Approach in order to capture the design, implementation, evaluation and sustainability of the project. Project Cycle Management is divided into six phases: Programming, Identification, Formulation, Funding, Implementation and Evaluation (ITAD, 1999).

Phase 1: Programming – The PCM begins with the Programming phase, where the primary goal is to identify and agree on the main objectives of cooperation and the relevant sectoral priorities. This phase also aims to establish a feasible programming framework in which specific projects can be identified and prepared, with strategies for each priority formulated, taking into account lessons from past experiences.

Phase 2: Identification – In the Identification phase, specific actions are identified and analysed through consultations with the target group, involving a detailed problem analysis. Decisions are then made on the relevance of each project idea concerning the target groups and the established programming framework, with project ideas deemed relevant then selected for further development in the Formulation phase.

Phase 3: Formulation – During the Formulation phase, relevant project ideas are elaborated into detailed operational plans, with beneficiary groups

Figure 1
Project Cycle Management operations

Source: author's own work.

and other stakeholders participating in specifying the project details. Each project is assessed for feasibility (likelihood of success) and sustainability (potential for long-lasting benefits), and based on this assessment, a formal funding proposal is prepared and the search for funding begins. During the formulation and planning phase of the project it is also important to define the communication channels of the project team, calculating and predicting risk (risk management), defining the project evaluation indicators (quality management) and also the strategy of disseminating the results.

Phase 4: Funding – In the Funding phase, proposals are reviewed by the competent authorities, who decide on the project's financing. The funding body and the partner country agree on the implementation modalities, formalising them in a legal document outlining the financing and implementation arrangements.

Phase 5: Implementation – The Implementation phase involves executing the project, where all necessary material and immaterial resources are mobilised according to the Financing Plan. This phase includes tendering and awarding contracts for technical assistance, supplies and tasks. The project manager monitors progress in consultation with beneficiary groups and other stakeholders in order to ensure alignment with the project's objectives.

Phase 6: Evaluation – The Evaluation phase involves assessing the project's achievements and identifying lessons learned to improve the design of future projects. Typically following Implementation, evaluations can also be conducted during the project through Interim Evaluations to apply lessons learned to the remaining project phases. The quality assessment indicators that were determined at the project planning stage are also checked.

Needs analysis

Needs analysis involves a comprehensive examination of the requirements, expectations and concerns of all stakeholders involved in a project, and includes identifying key beneficiaries, understanding their socio-economic conditions, and analysing their specific needs. Regardless of whether the project is a community development initiative, an infrastructure project or a healthcare intervention, stakeholders' needs must be central to project planning (Stevens & Gilliam, 1998).

To conduct an effective needs analysis, it is crucial to consider the various entities and individuals who can be involved. This includes:

- The target group, primarily young people who frequently engage with the organisation's activities, to ensure their active involvement in the creation process.
- Partner organisations, to ensure they have a voice in decision-making.
- Local organisations that could become stakeholders.
- The organisation's staff and volunteers.
- Relevant bodies and agencies for statistical data.

Engaging these parties helps create a project with a tangible impact on both the local and partner communities, and including diverse perspectives provides a broader view of the needs at hand and helps to more effectively formulate the problems to be addressed. Various tools and methods can be employed, such as questionnaires with specific and open questions, observations, feedback from the target group, input from local organisations, statistical data and focus groups.

Needs analysis enables project managers to anticipate potential risks and challenges early in the project cycle (Cooper et al., 2005). By thoroughly understanding stakeholders' needs, organisations can develop strategies to mitigate risks and address obstacles that may hinder progress. Additionally, needs analysis helps identify opportunities for maximising project impact by focusing resources on areas of greatest need, ensuring that interventions are relevant, timely and impactful, by allowing for a targeted and tailored approach.

In conclusion, while needs assessment provides a broad understanding of needs at the macro level, needs analysis delves deeper into the specific competencies and skills required to achieve desired outcomes. Both processes are complementary and contribute to informed decision-making, resource allocation and the design of tailored interventions.

Monitoring a project

A very important part of a successful European Erasmus+ project proposal is monitoring the progress of the project, which is often ignored, or not given the necessary importance, resulting in an incomplete proposal that is ultimately rejected. Therefore, special attention should be paid to this factor in order to ensure a complete proposal with a higher chance of success. Below are some useful ideas and practices concerning the monitoring of the project, though they may not necessarily guarantee a successful outcome of the proposal.

Communication between the partners and monitoring the project's progress are directly related and should be given special importance. More specifically, when writing the application, the communication channels between the consortium, the roles to be undertaken by each member, the delivery dates of the deliverables, and the methods for monitoring them should be clearly defined.

The key to success for effective communication in the consortium is the equal participation of all members in decisions concerning the course of the project, but also the prospects of its continuation after its end and its further development. Readiness to share experiences should be fostered and inspired, while boasting expertise in specific subjects should be avoided, as the sharing of knowledge and experiences allows for the acquisition of new ideas, the application of new practices, and increased effectiveness through the experiences gained.

It is essential to bear in mind that the management of the plan, along with the methods and practices followed to control its progress, are crucial elements when writing the application and will be checked by the National Agency (European Commission, 2023). Whatever is written for implementation in the application should be effectively tracked throughout the project, with measurable indicators set to facilitate this process.

A very useful tool for tracking a plan is the Gantt chart, which is likely where project tracking should begin. The Gantt chart, a project management tool, is used for planning, scheduling and monitoring a project. Planning and scheduling, collaboration, resource allocation and task delegation can be improved through the use of a Gantt chart. Information is visually represented through a horizontal bar graph, allowing task schedules, dependencies and progress to be viewed at a glance by project managers and team members, enabling advance planning for all tasks and making them visible in one place, thereby empowering teams to deliver on time. The Gantt chart, displaying the start date and duration of each task that makes up a project, remains one of the most popular project management tools, enabling project progress to be viewed at a glance (Shweta & Bottorff, 2022).

The tasks in a project are represented on the Y axis of the Gantt chart, with their duration, for example per month, on the X axis. Each task is depicted by a bar, the length of which represents its duration. When two bars overlap on the X axis, it can be concluded that these tasks occur simultaneously. A Gantt chart proves useful in keeping a project on track, especially when multiple dependencies exist and many tasks take place concurrently.

Before a Gantt chart is created, the following information must be gathered: a list of tasks, start and end dates for each task, task dependencies, task owners, and team members allocated to each task. Initially, the creation of a list of tasks comprising the project should be done with the team, followed by estimating the duration, required resources and dependencies for each task, aiding in proper resource allocation. However, it is essential to be prepared for replanning and reallocating resources as the project progresses.

The Gant chart example (Figure 2) below provides a quick glance at all the processes that are included in a project.

An Erasmus+ project encompasses various activities, implemented not only during face-to-face meetings of the consortium members but also in between these meetings. Regular communication between partners throughout the duration of the project is of utmost importance; therefore, it is necessary for online meetings to be scheduled at least monthly. During these meetings, a clear agenda should be set to facilitate discussions on the project's progress, existing problems, solutions, schedule changes and other relevant issues concerning consortium members. This approach is essential for better control over the programme's development and to adequately prepare all partners for the face-to-face meetings.

The use of online video conferencing software, such as Microsoft Teams, Zoom and Webex, is considered highly effective in achieving this goal. Additionally, extraordinary communication among consortium members should not be neglected and should be maintained through other electronic communication channels such as Viber, WhatsApp, email, etc., which will significantly contribute to effective communication among consortium members, facilitating the exchange of ideas and experiences, as well as the swift resolution of extraordinary procedural issues.

Figure 2
Gantt chart example

MONTHS		1 (DEC)	2 (JAN)	3 (FEB)	4 (MAR)	5 (APR)	6 (MAY)	7 (JUN)	8 (JUL)	9 (AUG)	10 (SEP)	11 (OCT)	12 (NOV)	Tasks	Responsable	Partners
WORK PACKAGES - ACTIVITIES	n°															
Project management and implementation	1													Coordination	Partner 1	Partner 2 Partner 4 Partner 7 Partner 5 Partner 6 Partner 3
														Administrative and financial supervision (IPA and partner payment)		
														Partner interim reports		
														Online meeting		
														Reports (intermediary and final)		
														Project results evaluation		
														Questionnaire preparation for the needs' analysis		
														Questionnaire admnistering for the needs' analysis		
														Findings report		
First transnational project meeting (Spain)	2													First transnational meeting preparation	Partner 2	Partner 1 Partner 4 Partner 7 Partner 5 Partner 6 Partner 3
														First transnational meeting		
														First transnational meeting evaluation		
Second transnational project meeting (Poland)	3													Second transnational meeting preparation	Partner 3	Partner 1 Partner 2 Partner 4 Partner 7 Partner 5 Partner 6
														Second transnational meeting		
														Second transnational meeting evaluation		
Intellectual Output 1 (Scientific paper)	4													Literature review	Partner 4	Partner 1 Partner 2 Partner 7 Partner 5 Partner 6 Partner 3
														Paper preparation		
														Paper first draft		
														Paper review		
														Paper pubblication		
Intellectual Output 2 (Methodological Guidelines)	5													Proposition of the methodological guidelines	Partner 1	Partner 2 Partner 4 Partner 7 Partner 5 Partner 6 Partner 3
														Methodological guidelines tool developed		
														Methodological guidelines tool printed		
Multiplier event (Italy)	6													Multiplier event preparation	Partner 5	Partner 1 Partner 2 Partner 4 Partner 7 Partner 5 Partner 3
														Multiplier event		
														Multiplier event evaluation		
Short-term training event (Portugal)	7													Preparation of the short-term training event	Partner 6	Partner 1 Partner 2 Partner 4 Partner 7 Partner 6 Partner 3
														Short-term training event		
														Short-term training event evaluation		
Dissemination of results	8													Project approval press release	Partner 7	Partner 1 Partner 2 Partner 4 Partner 5 Partner 6 Partner 3
														Project Kick off meeting press release		
														Project logo creation		
														Project web page creation		
														Project Facebook page creation		
														First project transnational meeting post/press release		
														Second project transnational meeting post/press release		
														Short-term training event post/press release		
														Methodological guidelines tool post/press release		
														Paper publication post/press release		
														Multiplier event post/press release		

Source: author's own work.

After each planned online communication, it is also deemed useful to have a follow-up document, where the project coordinator records all discussed topics, decisions made, the member responsible for the implementation of planned actions, and the time limits set for each action.

A very useful tool, and at the same time necessary for monitoring the development of a project, as well as its evaluation and control by the National Agency, is the Mobility Tool. This tool is provided by the European Commission and is mandatory to be used in order to monitor, complete and evaluate each approved project.

The Mobility Tool+ system is utilised by Erasmus+ and European Solidarity Corps beneficiary organisations to access and manage project informa-

Figure 3
Follow up document example

Action/decision	Who	Deadline	Results
To check how Europass is working	All, especially Partner 3 who has better expertise on the topic	ASAP	Having checked the procedure for Europass issue
To check names of authors of the publication	All	By mid of March 2023	Having sent the names of authors of the publication
Check the final publication version	All	ASAP	Having checked the final publication version
To send official logo and disclaimer	Partner 1	ASAP	Having sent the official logo and disclaimer
Prepare the meeting Agenda for next TPM	Partner 1	ASAP	Having sent the meeting agenda
Scheduling of the next monthly online meeting	All	Now	The next monthly meeting is scheduled for the 23/03/2023 10:30 CET

Source: author's own work.

tion, including encoding activities and participants, requesting individual participants' reports, and submitting final reports to their National Agencies (https://shorturl.at/vABH9). National Agencies also employ Mobility Tool+ to monitor and validate information entered by beneficiary organisations at any time from any location, as outlined in the quick guide (https://shorturl.at/cilCF).

Designed, developed and maintained by the European Commission, Mobility Tool+ is used by beneficiary organisations and National Agencies involved in decentralised projects. Comprehensive information and answers to frequently asked questions about using the Mobility Tool are available in the official guide or on the official wiki of the European Commission (https://wikis.ec.europa.eu/display/NAITDOC/Mobility+Tool+Guide+for+Beneficiaries). This guide explains how to use the Mobility Tool for Erasmus+ and European Solidarity Corps programmes to manage project information, such as encoding activities and participants, requesting individual participants' reports, and submitting final reports to National Agencies.

The Mobility Tool can be accessed directly at https://webgate.ec.europa.eu/eac/mobility; however, an account is required to view and manage approved projects. The Mobility Tool offers a variety of management and monitoring tabs, as illustrated in the accompanying image: Organisation Details, Contacts, Management and Implementation, Learning and Training Activities, Special Costs, Project Events, Budget and Reports.

Dissemination of a project

The project should be conceptualised as a brand that requires promotion and recognition. Similar to a well-designed website with competitive prices and unique products, a project with original ideas and important discussions may remain unnoticed without effective promotion. To enhance visibility and impact, the project's outcomes should be communicated dynamically and effectively, aligning with the objectives of European programmes.

The primary aim of dissemination is to increase awareness of the project's goals, activities and results through diverse online and offline channels, materials and conferences. Effective dissemination can elevate the organisation's profile, create opportunities for project extension, and foster future partnerships. Detailed dissemination activities are also required for reporting purposes and should be considered throughout the project's lifecycle.

All communication and dissemination activities should adhere to the project's Dissemination and Sustainability Plan, ensuring that promotional materials reflect the visual identity of both the project and the Erasmus+ Programme. Dissemination of project results continues the supervision and monitoring process, aligned with the programme's objectives and deliverables. A table (Figure 4) can be organised to outline the project's goals and deliverables, identifying key elements to share globally for increased recognition. Each consortium member should actively disseminate partnership results to expand the network of message recipients.

Effective communication of projects and their results is crucial to ensuring impact at various levels, with applicants for Erasmus+ funding required to plan communication activities aimed at disseminating information about their projects and outcomes during and beyond the project lifecycle. Project applications are evaluated based on specific criteria to ensure comprehensive coverage of these aspects, and the level and intensity of communication and dissemination activities should be proportional to the objectives, scope and targets of the different Erasmus+ actions (European Commission, 2021a).

Once the strategy is in place, break it into a communication plan. The strategy should be accompanied by a plan that is specific, time-based and developed at the beginning of each year. While the strategy tells you "what to do", the plan focuses on "how to

Figure 4
Example of a project Dissemination Tasks table

Project Dissemination Tasks

All partners should disseminate the project according to the following table. When a task is considered done, a tick should be placed to the appropriate box.
Also, all partners should take images from the tasks done and upload them to the shared folder. For example task1a.jpg, taks1b.jpg, task2a.jpg, etc. (contact person -aaaa@gmail.com)

	Partner 1	Partner 2	Partner 3	Partner 3	Partner 4	Partner 5	Partner 6
Tasks							
Task 1: Publish - Announce at isntitution website and Social Media the approval of project and that it is funded by the EU Erasmus		√					√
Task 2: Publish at isntitution website and Social Media the objectives and the summary of the project							√
Task 3: Publish at institution website and social media the logo of the project and the webpage xxx-project.eu				√			√
Task 4: Publish at institution website and social media the need analysis performed		√					
Task 5: Publish at institution website and social media all the transnational meeting press release that are published at official website at your own language					√		
Task 6: Publish at institution website and social media the scientific paper performed by the project			√				
Task 7: Publish at institution website and social media the IO results		√			√		
Task 8: Re-post from official FB page at least 5 posts to your institution social media page	√						
Task 9: Re-post from the official website (news category) at least 5 posts to your institution social media		√		√			
Task 10: All partners should follow the official FB page of the project and send traffic (Likes, post replies) and invite at least 20 people to like the page			√				√

Source: author's own work.

do it". A dissemination plan is a roadmap to organise the dissemination work according to time, needs and resources. It is important to invest time on it in order to take effective decisions and reach objectives (European Commission, 2021b).

Erasmus+ generates a wealth of powerful, personal stories that are ready to be shared and likely to create excitement. Applicants need to choose the channels and activities to reach the target audience that are the most effective and appropriate to meet the needs of their chosen targets, such as social media, events and publications. The project should result (outputs and outcomes) in a good practice guide, a practical tool or product, research report of studies, knowledge and skills gained and so on, and the results should be shared or promoted via the Erasmus+ Project Result Platform (European Commission, 2021c).

Questions considered by the project team during the planning phase can also be utilised during the dissemination phase of the project results to effectively target the recipients. The first question that needs to be addressed is the desired achievements of the project and its results, and the primary and secondary target groups should be identified, including their interests, needs, characteristics, and attitudes, to determine the focus of activities and messages. The methods to reach the audiences should be brainstormed with partners to identify the best and most cost-efficient communication activities and channels (European Commission, 2021b). A list of good practices that can be used to disseminate the project is provided below:

- A website serves as the main repository for project content, showcasing information, stories and results, and is considered the most comprehensive channel. For medium-small projects, a landing page or a section on the project partners' websites can be used instead. An example of an effective Erasmus+ project webpage is https://way-project.eu.

- The Project Result Platforms function as databases containing descriptions, results and contact information for all projects funded under the Erasmus+, Creative Europe and European Solidarity Corps programmes.
- Events offer an ideal opportunity to showcase project results, and can range from small gatherings organised by project partners to larger events jointly organised by multiple stakeholders or in collaboration with EU Institutions. Events can be organised during and after the project cycle, and participation in events organised by other beneficiaries and institutions can also be considered.
- Social media channels such as Facebook, Instagram, TikTok, Twitter or LinkedIn can be utilised to disseminate project information. The appropriate platforms should be selected based on the project's purpose and resources, considering the unique features, advantages and disadvantages of each platform.
- Media outreach involves sharing stories and results with journalists to reach a wider audience and maximise outreach. Local online newspapers can be used to announce project results and deliverables.
- Special occasions, such as anniversaries or recognised international days, provide an opportunity to increase project promotion and publicity efforts, serving as hooks to attract traffic to project posts.
- Newsletters can be used for dissemination by collecting journalists' contact information and creating a distribution list. Contact information can be gathered through Google's "News" section or subscription databases that provide media lists. A subscription form on the website or at organised events can also help gather interested individuals.
- Creating a logo and using flyers, stickers and posters to disseminate ideas and project information is recommended, and can be shared with potential stakeholders in schools and organisations.

The above-mentioned practices for disseminating the results of a project are not a panacea. They are indicative ways that can be used, and which, based on the experience and the guidelines of the European Commission, are good practices to make a project more competitive, but other methods can certainly be employed as well in order to achieve the maximum possible dissemination of a programme's results.

Evaluation of a project

The final step in successful strategic dissemination involves evaluating project activities and understanding their effectiveness, with simple indicators established to measure the success of dissemination efforts. Surveys, website click counts and social media analytics can be used to assess performance. Performance indicators serve as quantitative or qualitative criteria that gauge the success of dissemination activities by measuring "how much," "how many," "to what extent," or "what size."

In addition to evaluating the programme, possible risks that may necessitate changes to the original plan should always be considered. Risk management involves the identification, assessment, and prioritisation of risks to minimise, monitor and control the probability and/or impact of adverse events, also known as threats. Since not all risks can be eliminated, mitigation strategies and contingency plans should be developed to lessen their impact, should they occur. Effective risk management requires an informed understanding of relevant risks, an assessment of their relative priority, and a rigorous approach to monitoring and controlling them. The responsibility of managing project risks lies with the Coordinator (DIMPS, 2022). Possible risks, such as the suspension of mobilities during the Covid period, a partner's inability to participate in the project, a partner's failure to fulfill project requirements, or miscalculated budgets requiring additional resources, should be considered.

Performance indicators, defined during the formulation phase, serve as valuable management tools for monitoring progress and allowing for adjustments if needed during the implementation of communication and dissemination activities. These indicators also help evaluate the degree of success in achieving objectives. For example, metrics such as the number of participants who attended the event both physically and online, the number of likes or comments on related social media posts, the number of livestream followers, the number of unique visits to the website's article about the event, and the results of the post-event satisfaction survey can be utilised.

Quality management, fundamental to the project's success, involves defining the strategy and methods to ensure that deliverables are of acceptable quality before delivery. The project adopts a methodology with two separate processes:

- Quality assurance, which involves executing processes and procedures to ensure the achievement of quality and that the project satisfies its intended purpose.
- Quality control, which verifies and assesses the achievement/product, focusing on operational activities and techniques used to fulfill quality requirements. Inspection and product testing are examples of quality control tools.

Once indicators are set, data collection and thorough analysis should follow. A well-conducted evaluation provides helpful feedback and new ideas for future communication activities. Digital channels, such as social media platforms or website providers, offer free built-in tools to monitor reach and engagement, providing direct and almost "live" feedback on communication activities' performance.

The evaluation of a project's success is directly related to the goals set at the beginning, and whether

they have been achieved, which is why it is crucial to define clear goals, intended results, and criteria for evaluating the achieved results from the outset. These criteria can be both quantitative and easily measurable, as well as qualitative. A sample project evaluation is depicted below (Figure 5).

Figure 5
Example of qualitative and quantitative evaluation

Expected Results	Responsible	Organization	Indicators planned		Source of Verification
			Qualitative	Quantitative	
30-pages report resulting from the needs analysis that will be conducted in each country participating in the project	Partner 1	Partner 1 Partner 3 Partner 5 Partner 4 Partner 7 Partner 6	Bibliographical research contents according to the findings of project questionnaire	It will be considered successful, if all the partner organisations drafted the planned organization's strengths and shortcomings description report	6 reports. One from each organization
20-pages scientific paper on the whole-school approach borrowed and adapted from the SHE model and published in the "Health Promotion International" journal by the Oxford University Press	Partner 2	Partner 1 Partner 3 Partner 5 Partner 4 Partner 7 Partner 6	Research analysis and importance of journal that the article published	It will be considered successful if the article will be published in the Journal	Publication of the scientific paper in Journal
30-pages methodological guidelines for the training of teachers, educators, youth workers with regard to whole-school approach to education to students with migrant background	Partner 1	Partner 3 Partner 5 Partner 4 Partner 2 Partner 7 Partner 6	Research and conclusions consistent with the topic	It will be considered successful if 75% of participants of the 60 teachers, educators, youth workers declare, it is useful	Questionnaire evaluation
Short-term training event (Portugal)	Partner 3	Partner 1 Partner 5 Partner 4 Partner 2 Partner 7 Partner 6	Trainees active participation in the training activities	It will be considered successful if 75% of participants of the 60 teachers, educators, youth workers declares that the training has supported them in developing the competences of the whole-school approach	Questionnaire evaluation, Europass
First transnational meeting in Spain	Partner 4	Partner 1 Partner 3 Partner 2 Partner 7 Partner 6	Partners participation and engagement at TPM discussions	All partners will participate with 2 participants	Certificate of Attendance
Second transnational meeting in Poland	Partner 5	Partner 1 Partner 3 Partner 2 Partner 7 Partner 6	Partners participation and engagement at TPM discussions	All partners will participate with 2 participants	Certificate of Attendance

Source: author's own work.

Sustainability of a project

Sustainability is the ability of an organisation to continue its mission or project far into the future. All projects will end eventually, but the project impact should continue. Project sustainability is the goal of creating and successfully launching a project that will continue to generate benefits for an extended period of time.

To ensure the recognition of a project and its sustainability after its end, a series of websites can additionally be utilised. These websites, created precisely for this purpose, are well-known, experience high traffic, and are used by millions of users (Figure 6).

The competitiveness of the project will be gained using the above platforms, which can also serve as a starting point for new collaboration and the future continuation of the project with new ideas and interested partners. In the case of the eTwinning platform in particular, if a school unit is involved in the project, a relevant collaboration space can be created and collaboration with interested educational organisations can be requested, ensuring sustainability of the project. eTwinning, the Community for Schools in Europe, allows educators from all participating countries to register and use its online tools to locate each other, meet virtually, exchange ideas and examples of best practices, form teams, learn together at Learning Events, and undertake online projects.

The prospects of improving or expanding the project should be discussed with the partners in the context of future collaboration. Achievements should be reviewed, future goals set, new ideas explored, and feedback gathered from participants or the audience to whom the results were disseminated. The project website should be maintained after the project ends, with new goals established, and the implemented project can also serve as the foundation for new cooperation, leading to the continuation and expansion of the programme, with multiple benefits for European citizens.

Conclusions

Developing and writing a comprehensive proposal for a European project is a complex process that requires meticulous planning and structure from start to finish, and as more schools and organisations gain considerable experience and complete numerous European projects, competition in this field is intensifying, with high-quality proposals often going unfunded due to budget constraints, rather than deficiencies in the proposals themselves, meaning that careful preparation and attention to detail are essential to gain a comparative advantage. If a proposal is not approved despite receiving a high score, it is crucial to thoroughly review the feedback from the evaluator and the National Agency in order to refine and resubmit the proposal. There is no secret recipe guaranteeing the submission of a successful proposal, but this article provides guidelines and techniques for submitting a comprehensive proposal, significantly increasing the chances of success.

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Figure 6

Digital platforms and tools connected to Erasmus+

Digital platforms and tools connected to Erasmus+	
eTwinning https://www.etwinning.net	Encouraging European schools to collaborate and benefit from endless opportunities
School education gateway https://www.schooleducationgateway.eu/	Europe's online platform for school education
EPALE https://epale.ec.europa.eu/en	Electronic Platform for Adult Learning in Europe
Youth portal https://europa.eu/youth/EU_en	Access to youth related European and national information
SELFIE https://ec.europa.eu/education/schools-go-digital_en	Tools meant to help schools assess their digital learning potential, involving the whole school community in the process (leaders, teachers, students)
Europass https://europa.eu/europass/en	Personal tool for learning and working in Europe
Youthpass https://www.youthpass.eu/en/about-youthpass/about/	Tool that documents learning outcomes from youth and solidarity activities

Source: author's own work.

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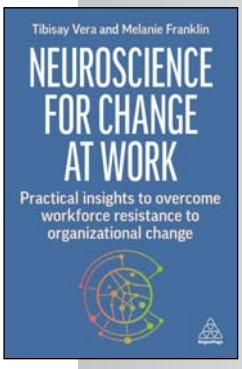
We recommend



Tibisay Vera, Melanie Franklin, *Neuroscience for Change at Work. Practical Insights to Overcome Workforce Resistance to Organizational Change*

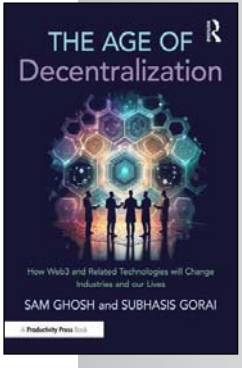
Neuroscience for Change at Work answers these questions and explains how to use insights from neuroscience when designing change and communicating it to employees. It is based on the PEPE model which outlines the four fundamental principles that drive resistance to change in individuals, teams and the wider organization. This book provides specific coverage of how neuroscience can inform change initiatives in remote, hybrid and in-person working environments to ensure successful business transformation in any working model. There is also discussion of how change can impact employee mental health and wellbeing and explains how using insights from neuroscience can help to safeguard this. There is also discussion of how to handle competing priorities from different groups of employees during times of business change.

Every chapter of *Neuroscience for Change at Work* is supported by practical examples, tips, tools and case studies as well as robust, evidence-based insights from neuroscience. Co-authored by a neuroscientist with extensive experience in applying neuroscience to business transformation projects, this book is a practical guide for all change managers and anyone responsible for employee engagement, wellbeing and productivity during times of change.

Date of publication: September, 2024

Publisher: Kogan Page Ltd.

Source of the description: **https://www.koganpage.com/hr-learning-development/neuroscience-for-change-at-work-9781398614406**



Sam Ghosh, Subhasis Gorai, *The Age of Decentralization. How Web3 and Related Technologies will change Industries and our Lives*

The Age of Decentralization talks about various decentralization technologies including Web3, decentralized identity, and decentralized storage, and how they can be incorporated in traditional tech architectures to improve technical and business performance.

In this book, the authors take us on a journey through the tech landscape, exploring how decentralized technologies, including Web3, are on the verge of becoming mainstream and offer a practical roadmap for understanding and embracing this shift. Web2 brought us "the great centralization" by centralizing not only data but also business processes, blurring the industry boundaries. So, payment platforms started offering e-commerce services and ride-hailing services started delivering food. Scale became the most effective moat. But, at the same time, these huge platforms became a magnet for security threats and started violating user privacy rights and consumer rights. The authors argue that the technological, regulatory, and social landscape is ready for the next evolution of technology systems as decentralization technologies get incorporated into traditional architectures.

This book serves as a guide for readers to understand the fundamentals of Web3 along with other decentralized technologies and creates a framework for incorporating them into traditional architectures. At the same time, the authors explore the organization level as well as the macro implications of decentralized technologies.

Date of publication: October, 2024

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Source of the description: **https://www.routledge.com/The-Age-of-Decentralization-How-Web3-and-Related-Technologies-will-change-Industries-and-our-Lives/Ghosh-Gorai/p/book/9781032830216**

Maria Bajak

Łukasz Spendel

Using artificial intelligence in business: the example of ChatGPT in management

Abstract

Generative artificial intelligence is used to create new content and solutions through its ability to discover relationships in raw data, thus simulating the human thinking process. One particularly popular tool of this type is ChatGPT, which generates text and helps to solve a variety of problems. Consequently, it can also support company management by helping in the performance of various functions. By automating routine tasks, for example, it allows employees to focus on more strategic activities, while the use of data to identify trends supports informed decision-making, which enhances a company's competitiveness and efficiency. The primary objective of the presented paper was to identify the key areas of application of ChatGPT in management. Accordingly, a quantitative and qualitative bibliometric analysis of the literature on this subject from the Web of Science and Scopus databases was undertaken, with a targeted selection of examples for case studies made based on the main research areas identified through bibliometric mapping. The article not only outlines the general trends related to the growth of the literature on ChatGPT in the field of management and quality sciences, but also specifies the main ways in which this tool supports management. It was noted that due to its ability to generate, automate, analyse and optimise, ChatGPT in management practice primarily supports (internal and external) communication, data use and problem solving.

Keywords: ChatGPT, management, generative artificial intelligence, AI, artificial intelligence in management

Introduction

Artificial intelligence can be defined as a multidisciplinary technology that, through the use of data, algorithms and computing power, can efficiently process information, simulating various aspects of human intelligence (Lu, 2024). Due to their ability to process huge data sets, these types of systems are particularly useful in sectors where analysing large volumes of information is essential, and it is these systems that predominantly set the course for the further development of this type of technology (Zhang & Lu, 2021). Moreover, the most recent systems that use deep learning mechanisms not only have the ability to conduct traditional data analysis (Janiesch et al., 2021; Taye, 2023), but are also capable of discovering relationships and objects in raw data, as well as creating new functionalities (Garnelo & Shanahan, 2019; Nasution et al., 2020). To this end, neural network algorithms build predictive models around complex problems involving natural language processing, computer vision, or content generation (Bisong, 2019; Xie et al., 2017).

There are many generative artificial intelligence tools that are used to produce new and creative content, including text, images, video, music, as well as other forms of design (Muller et al., 2022), and ChatGPT is among them. According to the information generated by this system, it is "an advanced artificial intelligence language model developed by OpenAI, specifically belonging to the GPT (Generative Pre-trained Transformer) family, and which perfectly understands and generates human-like text from the input received. Trained on a diverse range of internet text, ChatGPT can engage in conversations, answer questions, generate creative content and assist with a variety of tasks requiring natural language understanding and generation" (ChatGPT, n.d.). Similar information on this system can also be found in scientific publications, with ChatGPT's ability to perform the tasks related to understanding and generating language according

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to the user's prompts highlighted in particular (Aslam & Nisar, 2023; Javaid et al., 2023; Wu et al., 2023). It is capable of having conversations (Abdullah et al., 2022; Bansal et al., 2024), helping to solve problems (Bapat et al., 2023; Li, 2023), and producing creative content (Htet et al., 2023; Wang et al., 2023).

For a user to interact with ChatGPT, a text prompt must be written, for example in the form of a question or command. It must be worded as precisely as possible, as this has a significant effect on the system's ability to solve the problem specified in the prompt (Wang et al., 2024). An answer is then generated based on the knowledge acquired by the tool through its previous interactions with web resources based on deep learning mechanisms (Pavlik, 2023, Wu et al., 2023), meaning that the potential of this tool can be evaluated as growing steadily with each new interaction. Due to its functionalities, as well as its efficiency and increasing effectiveness, ChatGPT can be used in various fields of life, including medicine, education and research, as well as management (Alafnan et al., 2023; Ayinde, 2023; Kung et al., 2023; Sedaghat, 2023; Silva & Janes, 2022).

The primary objective of the presented paper was to identify the key application areas of ChatGPT in management. Accordingly, a bibliometric analysis of the literature on this subject from the Web of Science and Scopus databases was undertaken, based on which a targeted selection of examples for case studies was made. The article not only outlines the general trends related to the growth of the literature on ChatGPT in the field of management and quality sciences, but also specifies the main ways in which this tool supports management.

Objective and research method used

The primary objective of the presented paper was to identify the key application areas of ChatGPT in management. In order to meet the objectives of this study, while combining a theoretical approach with business practice, a decision was made to use two research methods: bibliometric analysis and a multiple case study. First, a bibliometric analysis involving quantitative and qualitative research of publications from the Web of Science and Scopus databases that contain the phrase 'ChatGPT' or 'Chat GPT' in their subject (title, keywords and abstract) was undertaken, followed by bibliometric mapping and a multiple case study, with a targeted selection of examples based on the research conducted.

The core tasks of bibliometrics include exploring the content of databases, analysing trends, identifying major research themes, and examining the links between them (Ejdys, 2016; Olczyk, 2016; Theus, 2016). The research first focused on identifying general trends in the literature on ChatGPT, particularly in the field of management and related sciences. In the context of the bibliometric research, the general trends related to the growth of the literature on ChatGPT in the field of management and quality sciences are presented. Bibliometric mapping was then performed using VosViewer software to reveal the popularity of individual keywords in the analysed articles from the Scopus and Web of Science databases, and the main research sub-areas for the subject of ChatGPT in management and quality sciences were identified. This was followed by an examination of practical examples of the tool's use in management, employing a multiple case study methodology. This is a qualitative method that involves creating a detailed and multi-dimensional description of the investigated phenomenon, and secondary and primary empirical material is used in the analysis of processes and their context (Matejun, 2012; Rashid et al., 2019). The studied examples of the use of artificial intelligence in advertising were selected in a targeted manner, based on their compatibility with the research areas identified in the bibliometric analysis, the innovativeness of the solutions used, and the possibility of their widespread use in business practice.

The final stage of the study was aimed at relating the discussed case studies to the results of the qualitative analysis of the literature exported during bibliometric research, based on which specific areas for the use of artificial intelligence in management were identified. The research was based on the following research questions:

- What are the general trends related to the proliferation of scientific publications on ChatGPT, particularly in the field of management and quality sciences?
- What research sub-areas can be identified in the literature on the use of ChatGPT in management and quality sciences?
- How can ChatGPT support management?

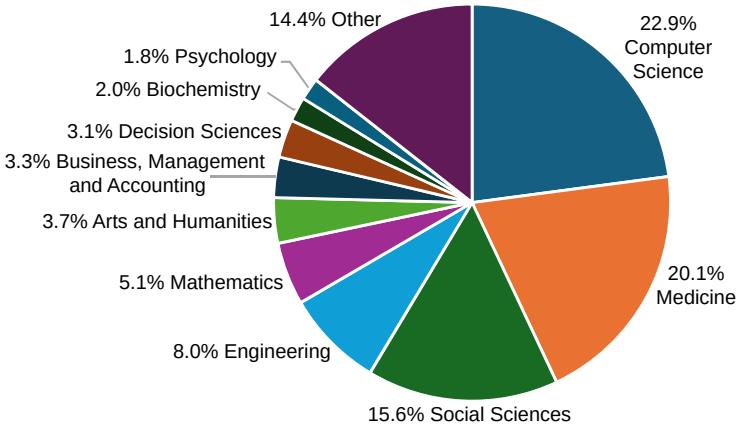
All the data for the research was exported on 20 April 2024, using Web of Science (https://www.webofscience.com) and Scopus (https://www.scopus.com) resources, and the links between the keywords were visualised with the VoSviewer software (https://www.vosviewer.com).

ChatGPT in publications in the field of management and quality sciences

A total of 4,336 publications that included the phrase 'ChatGPT' or 'Chat GPT' in the subject were classified in the Web of Science database, while 7,055 such publications were identified in the Scopus database. A provisional thematic analysis indicates that in the Web of Science database, 148 of the indexed items deal with issues similar to this paper (Business; Management; Communication). In the Scopus database, in turn, which quantitatively has more items thematically related to ChatGPT, these mostly deal with the areas of Computer Science, Medicine and Social Sciences (Figure 1). As few as 399 papers relate to the area of Business, Management and Accounting.

For the purposes of this research, a quantitative summary of publications on the subject of 'ChatGPT' that are available in the Web of Science and Scopus databases (Table 1) was compiled. The literature is presented in general (all available publications) and

Figure 1
Themes covered by publications on 'ChatGPT' or 'Chat GPT' in the Scopus database



Source: authors' own work based on Scopus.

Table 1
Summary of literature on ChatGPT available in the Web of Science and Scopus databases – general approach and with thematic focus on management and quality sciences

Data*	'ChatGPT' or 'Chat GPT'			
	All publications available		Publications in the field of management and quality sciences	
	Web of Science	Scopus	Web of Science	Scopus
Number of publications	4,336	7,055	148	399
Number of citations	6,372	35,576	648	3,206
Average number of citations	5.26	5.07	4.38	8.04
h-index	58	76	12	25
Year of the earliest publication	2022	2022	2023	2022
Authors with the highest number of publications	Wiwanitkit (104); Kleebayoon (57); Daungsupawong (41)	Wiwanitkit (127); Kleebayoon (66); Daungsupawong (55)	Chowdhury (4); Aguinis (3); Beltran (3); Dwivedi (3); Kanbach (3)	Dwivedi (6); Kim (5); Chowdhury (4); Korzynski (4); Mazurek (4)
Publications with the highest number of citations	Dwivedi et al., 2023 (664); van Dis et al., 2023 (417); Sallam, 2023 (383)	Dwivedi et al., 2023 (664); Sallam, 2023 (573); Kasneci et al., 2023 (572)	Lim et al., 2023 (100); Paul et al., 2023 (58); Peres et al., 2023 (49)	Dwivedi et al., 2023 (664); Lim et al., 2023 (160); Haleem et al., 2022 (145)
Research centres with the highest number of affiliations	University of California System (101); Chandigarh University (74); Harvard University (72)	Chandigarh University (92); Harvard Medical School (70); National University of Singapore (67)	George Washington University (4); Indian Institute of Management IMM System (4); Newcastle University UK (4); Swansea University (4)	Swansea University (7); Kyung Hee University (6); Auckland University of Technology (6); University of Southern California (6)
Journals with the highest number of publications	Cureus: Journal of Medical Science (176); Annals of Biomedical Engineering (72); JMIR Medical Education (51)	Lecture Notes in Computer Science including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics (129); CEUR Workshop Proceedings (125); ACM International Conference Proceeding Series (109)	International Journal of Management Education (8); Profesional de la Información (8); Online Journal of Communication and Media Technologies (7)	Lecture Notes in Business Information Processing (13); Humanities and Social Sciences Communications (12); Technology in Society (11)

Note. *All the data for the research was exported on 20 April 2024.

Source: authors' own work.

in the field of management and quality sciences (Web of Science: Business; Management; Communication; Scopus: Business, Management and Accounting).

It is worth noting that the ChatGPT tool was released for use in 2022, so the earliest publications on the tool are from that year. In practice, we can therefore speak of a dynamic proliferation of scientific literature in this field, while at the same time, its themes are highly fragmented, due to the constant search for new ways to use this technology. We can also expect an increasing interest among ChatGPT researchers, due to its growing popularity in business practice, and similar trends may also be relevant for other related generative artificial intelligence tools (e.g. Character.AI, Midjourney).

ChatGPT in management and quality sciences – research sub-areas

In the following analysis, articles from the Web of Science and Scopus databases in the field of management and related sciences (Web of Science: Business; Management; Communication – 148; Scopus: Business, Management and Accounting – 399) that had the phrase 'ChatGPT' or 'Chat GPT' in their subject were exported. Duplicate papers were then removed, resulting in 483 publications for further analysis. Using the VosViewer software, the co-occurrence of keywords in the studied papers was examined, with a total of 2,202 keywords obtained, from which those repeating at least 10 times were identified. Thus, a visualisation of the links between the 31 most frequent keywords was obtained (Figure 2).

The keywords depicted in the cluster map fall into 4 thematic clusters:

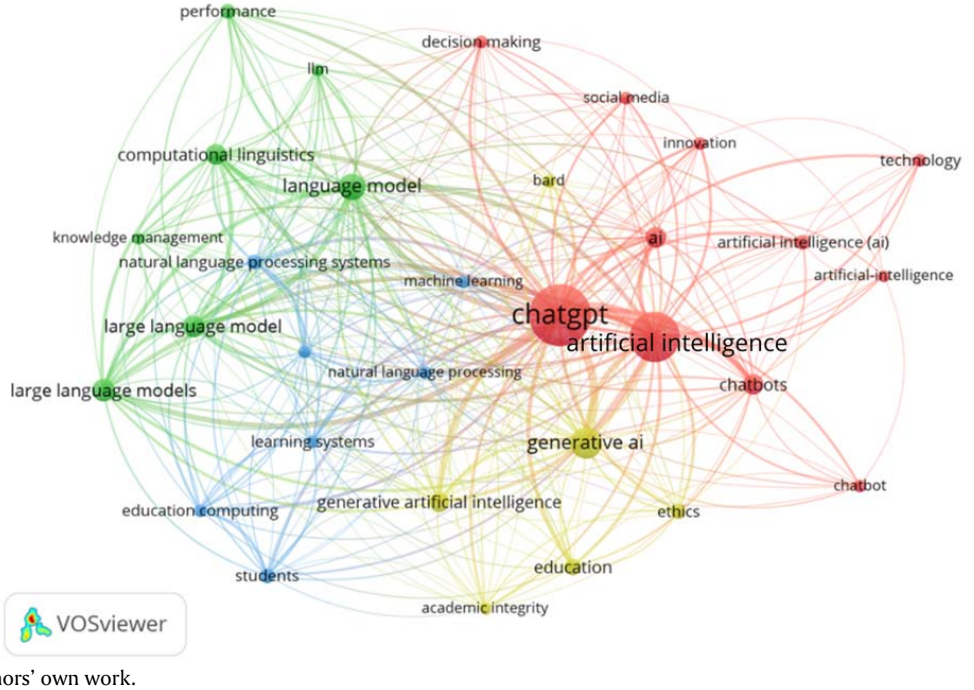
- the red cluster – 11 elements – related to the subject of AI-related tools, as well as customer support in the purchasing process, promotion and purchasing decisions; the most popular keyword in the cluster is *'ChatGPT'*, which occurred 273 times, followed by the phrase *'artificial intelligence'*, which was used 180 times,
- the green cluster – 7 elements – focusing on language models, linguistics and system performance, with the phrase *'language model'* as the most frequent, used 50 times,
- the blue cluster – 7 elements – mainly related to education and learning – both in the context of computer system learning and youth education, where the most frequent keyword was *'natural language processing systems'*, which occurred 17 times,
- the yellow cluster – 6 elements – mainly covering subjects related to generative artificial intelligence, its use in education, and ethics, with the most frequent term being *'generative AI'*, occurring 73 times.

The bibliometric analysis therefore allows for the identification of 4 main thematic sub-areas, which represent exemplary research directions for the issue of the use of ChatGPT in various management areas (Table 2).

It should be noted that the identified research sub-areas are to some extent overlapping, which is due to the multi-dimensional quality of artificial intelligence technology and the diversity of ChatGPT's uses in

Figure 2

Map of links between keywords in articles on ChatGPT in the field of management and related sciences



Source: authors' own work.

Table 2
Main research sub-areas for the subject of ChatGPT in management and quality sciences with sample references

Research sub-area	Sample themes	Most popular keywords	Sample references
Purchasing processes and promotion (the red cluster)	artificial intelligence, decision-making, chatbots, social media	ChatGPT (273); artificial intelligence (180); AI (32); chatbots (31)	Haleem et al., 2022; Taecharungroj, 2023; Hussain et al., 2024; Kirshner, 2024
Language models and knowledge management (the green cluster)	language models, knowledge management, performance	language model (50); large language models (38); computational linguistics (31)	Dwivedi et al., 2023; Leinonen et al., 2023; Bin-Nashwan et al., 2023
Machine learning and collaborative working (the blue cluster)	machine learning, education, natural language processing	natural language processing systems (17); students (16); education computing (13); learning systems (13)	Javaid et al., 2023; Malinka et al., 2023; Nithithanatchinnapat et al., 2024; Xing et al., 2024
Educational and ethical aspects of generative AI (the yellow cluster)	generative AI, ethics, education, academic integrity	generative AI (70); generative artificial intelligence (27); education (21); ethics (17)	Lim et al., 2023; Halaweh, 2023; Adiguzel et al., 2023; Stahl & Eke, 2024

Source: authors' own work.

various management areas. It is also worth noting that a large share of the publications deals with issues related to computer systems and their operation, rather than the effects of their use.

Overview of selected ChatGPT applications in management

The study analysed eight carefully selected examples of the use of artificial intelligence in advertising (Table 3), which were classified according to the research areas identified as a result of mapping the results of the bibliometric analysis. The discussed examples of the use of artificial intelligence in advertising were selected in a targeted manner, based on the following criteria:

- the possibility of widespread use of the applied solutions in business practice,
- innovativeness of the solution examined,
- compatibility of the use of ChatGPT with the research areas identified in the bibliometric analysis.

ChatGPT is a tool that can support the management of a company on various levels. As demonstrated by practical examples, its applications are relevant to each of the management functions, i.e. planning, organising, directing and controlling. Moreover, it is used both inside and outside the company, and ChatGPT-based solutions have multi-dimensional tasks, integrating the activities of multiple departments in the organisation.

Table 3
Overview of the solutions examined

No.	Company name	Description of the solution	How is ChatGPT used
Purchasing processes and promotion			
1.	Carrefour	The brand has implemented OpenAI technology in three areas of management: a chatbot that allows to communicate using natural language with the customer, based on which it can indicate the products in which the consumer may be interested; dedicated product data descriptions using ChatGPT 4.0; supporting internal customer service processes, as well as preparing tenders and price quotes based on the inputs.	• communication with customers • product recommendations • creation of customised descriptions • customer service coordination • data analysis
2.	Morele.net	By using ChatGPT, the brand creates personalised shopping recommendations for customers based on their individual preferences, and additionally answers consumers' questions about specific products. At the same time, the company measures the effectiveness of the tool in order to optimise its use.	• communication with customers • product recommendations • answering questions • data provision and analysis

Table 3 – continue

No.	Company name	Description of the solution	How is ChatGPT used
Language models and knowledge management			
3.	Mercedes-Benz	Through the use of an the intelligent manufacturing ecosystem – MO360 – employees and managers can access information generated from the analysis of manufacturing data, which ultimately enables the identification of errors and determining their causes, as well as managing quality and optimising processes along the entire production line.	• data analysis • error identification • identifying the causes of errors and opportunities for their elimination • process optimisation
4.	Ernst & Young	EY worked with Microsoft to develop a generative AI-based chatbot to answer payroll questions asked by employees from 159 countries and in 49 languages. Based on Microsoft Cloud and ChatGPT in the Azure OpenAI Service, Chatbot uses a large language model (LLM) that analyses information from payslips, tax laws and employer policies to provide answers to complex payroll questions – with the aim of increasing employee satisfaction and reducing costs for employers.	• holding conversations with employees • answering questions • analysing information and putting it in a broader context
Machine learning and collaborative working			
5.	KPMG	In collaboration with Microsoft, KPMG received its own version of ChatGPT – KymChat, which is used to automate administrative processes and support employees in their daily tasks. The tool is trained to perform new tasks based on the data provided by the company, and the solution consolidates collaboration between teams and aids the induction of new employees.	• automation of administrative processes • problem solving • education of new employees • promoting cooperation between teams
6.	The Coca-Cola Company	The Coca-Cola brand has signed a long-term strategic partnership with Microsoft to develop innovative cases for the use of generative artificial intelligence in optimising business operations. The collaboration is designed to improve the assistance of employees in improving the customer experience, to streamline operations, develop innovation, gain a competitive advantage, as well as increase productivity and help to identify new growth opportunities.	• supporting employees in their communication with other stakeholders • data analysis • process streamlining • problem solving and proposing new solutions
Educational and ethical aspects of generative AI			
7.	Pricewaterhouse Coopers	PwC's use of generative AI (ChatGPT Enterprise) provides its employees with the opportunity to use AI to deliver better results by educating internal customers, leading to increased productivity and helping them to develop new products and services. This allows for the provision of performance gains in tax and consulting services with a wide range of business and sector solutions.	• education of employees • suggesting solutions to employees based on data analysis • helping to develop new solutions
8.	Snapchat	Snapchat has made the GPT engine-powered 'My AI' Chatbot available to creators active on the platform. Its main purpose is to educate creators who want to become popular on the platform, to help them produce creative content and to provide answers to questions, which at the same time must be age-appropriate.	• analysing user data • educating external customers • creating content and supporting the creative process

Source: authors' own work based on: *Carrefour integrates OpenAI technologies and launches a generative AI-powered shopping experience,* Carrefour, 2023 (https://www.carrefour.com/en/news/2023/carrefour-integrates-openai-technologies-and-launches-generative-ai-powered-shopping); *Już tu jestem*, Morele.net, n.d. (Retrieved 2024, May 18, from https://www.morele.net/aktualnosc/juz-tu-jestem/22052/); *Mercedes-Benz tests ChatGPT in intelligent vehicle production,* Mercedes-Benz, 2023 (https://group.mercedes-benz.com/innovation/digitalisation/industry-4-0/chatgpt-in-vehicle-production.html); *The last frontier of disruption': With its new AI chatbot, EY teams seek to take the pain out of payroll questions,* D. Bach, 2023 (https://news.microsoft.com/source/features/digital-transformation/the-last-frontier-of-disruption-with-its-new-ai-chatbot-ey-teams-seek-to-take-the-pain-out-of-payroll-questions/); *KPMG KymChat – changing the game with Trusted AI*, KPMG, n.d. (Retrieved 2024, May 18, from https://kpmg.com/au/en/home/topics/artificial-intelligence-ai/kymchat-trustworthy-ai.html); *The Coca-Cola Company and Microsoft announce five-year strategic partnership to accelerate cloud and generative AI initiatives*, Coca-Cola, 2024 (https://www.coca-colacompany.com/media-center/the-coca-cola-company-and-microsoft-announce-five-year-strategic-partnership-to-accelerate-cloud-and-generative-ai-initiatives); *PwC is accelerating adoption of AI with ChatGPT Enterprise in US and UK and with clients,* PwC., 2024, May 29 (https://www.pwc.com/us/en/about-us/newsroom/press-releases/pwc-us-uk-accelerating-ai-chatgpt-enterprise-adoption.html); *My AI,* Snapchat, n.d. (Retrieved 2024, May 18, from https://help.snapchat.com/hc/pl/sections/13532188353428-My-AI).

Discussion

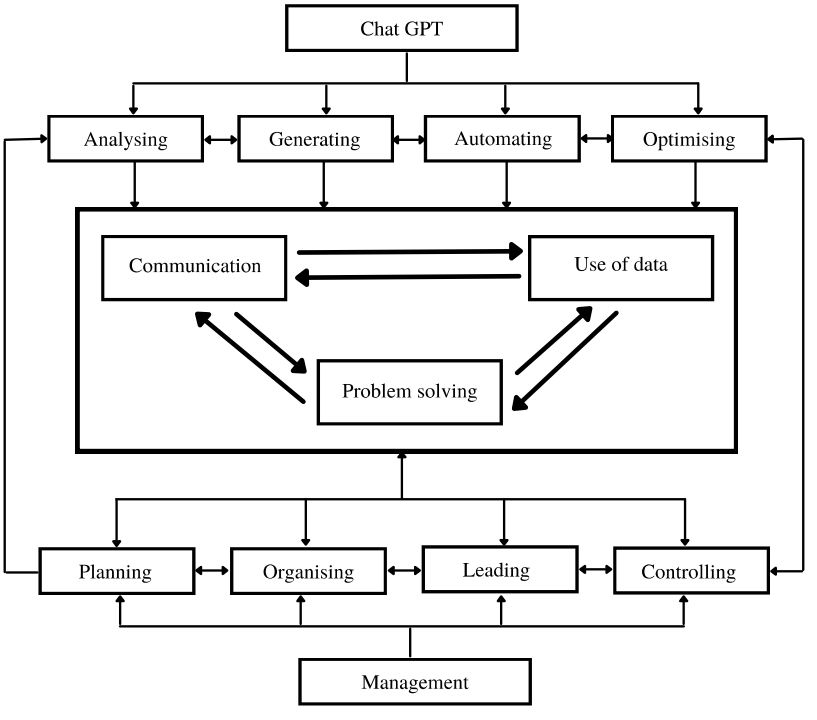
The tasks assigned to ChatGPT often concern skills such as communication, creativity, and collaboration (Giordano et al., 2024), and such systems can therefore interact with the user in real life, assist in decision-making and analyse the data acquired (Shahin et al., 2024). However, to produce satisfactory, valuable AI-generated content, it is essential to optimise prompts and to properly model the dialogue with ChatGPT (Christou et al., 2024; Klievtsova et al., 2023), because the system is not only capable of natural language processing and intelligent text generation, but also of interactive conversation (Taecharungroj, 2023; Yunfei et al., 2024). In business practice, it is used in a variety of applications that are related to:

- generating – the ability to engage in dialogue and produce varied content that is new and creative, though created from secondary data (Demir & Dalgiç, 2024; Haleem et al., 2022), which can be drawn from web resources but also provided directly by organisations,
- automating – the ability to mechanise processes, especially repetitive ones, whether inside or outside the company (Banafa, 2024; Raj, 2023),
- analysing – identifying trends and correlations in text or numerical data, capturing possible anomalies and creating reports based on the available information (Budhwar et al., 2023, Dwivedi et al., 2023),
- improving efficiency – optimising processes and making them more efficient by streamlining them and recommending possible solutions to emerging problems (Figueiredo, 2024; Skórnóg & Kmiecik, 2023).

It can be expected that these tools will ultimately contribute to increasing the competitiveness of market organisations, enhancing managerial competencies, and better aligning offerings and promotional activities with buyers' needs and expectations (Ballamudi, 2019; Pathak & Sharma, 2022). The analysis of the literature and the case studies shows that ChatGPT can support various management functions by offering advanced support in planning, organising, controlling and leading (Figure 2). With its ability to generate, automate, analyse and improve efficiency, it is deployed to support (internal and external) communication, use data to identify patterns and extract insights, and solve problems, supporting decision-making processes at different levels of the organisational structure.

One should, however, be aware that although the ability to streamline processes using ChatGPT brings many advantages, the tool also creates new challenges. On the one hand, these are problems at the strategic level, related, among others, to ethical issues, misinformation and social manipulation (Wach et al., 2023), as well as the need to devise appropriate market analysis techniques or reconsider one's strategies (Chiarello et al., 2024). On the other hand, some challenges also arise at the operational level,

Figure 3
Relevance of ChatGPT's capabilities to the various management functions



Source: authors' own work.

such as the abstraction bias in ChatGPT, barriers to the adoption of this type of content by the public, or even generation of false information (Haleem et al., 2022; Kirshner, 2024). Therefore, at this point in time, ChatGPT cannot be seen as a replacement for employees in the company's management-related departments, but rather as a prospective tool to support their work. Automation of some of the tasks would in fact allow human employees to focus on performing more strategic and complex duties (Raj et al., 2023).

Summary

ChatGPT is a prospective tool in many business areas. From a management perspective, it is relevant to all management functions, which is possible due to its capabilities, such as generating, automating, analysing and optimising. In the context of the above discussion, these can primarily be deployed to:

- Communicating – improving internal and external communication by better information flow, automating answers to frequently asked questions, induction of new employees, organising meetings, and reminding of important deadlines. Thus, ChatGPT contributes to reducing the time required to get an answer, increases work efficiency, educates the team, and improves customer service.
- Using the data – analysing large data sets to generate reports, analyse trends, or make predictions. As a result, patterns or causes can be identified, particularly for recurring problems or tasks. Therefore, data analysis by ChatGPT promotes the identification of new business opportunities, process optimisation and increased operational efficiency.
- Solving problems – providing quick and effective solutions to a variety of problems based on available knowledge. The software's ability to process natural language allows it to respond efficiently to complex queries, or to interpret data effectively, which substantially enhances an organisation's ability to respond quickly to problems. As a result, it enables managers to react quickly to changes in the business environment and adapt their operational strategies.

It is worth noting that the indicated areas of ChatGPT use are overlapping, which is related to their interdependence. Consequently, systems that integrate them can further support companies in achieving their strategic and operational goals.

The above considerations should be regarded as material for further research to deepen the results obtained. In the course of the analyses, it was noted that even though there is a growing understanding of the importance of ChatGPT for business, this subject is still not developed in the context of individual management functions. Several research gaps can be identified, primarily related to specific recommendations for the use of this tool in various areas of company management.

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Małgorzata Dolińska

Motivating crowd members to participate in open innovation processes on crowdsourcing platforms

Abstract

As online and voluntary workers, crowd members use and develop own knowledge and creative abilities during execution of open innovation processes on crowdsourcing platforms (CPs). Managers of CPs motivate crowdsourcing workers to effectively develop open innovations as well as new products or services for clients (such as companies, non-profit organizations or people) in accordance with their orders. The purpose of this paper is to present a model of motivating crowd members to participate in open innovation processes on CPs and verify its possible applications on the existing platforms. The model expands the Self-Determination Theory (SDT) framework and adapts the extrinsic, internalized, and intrinsic types of motivation to applications on CPs. Each type of motivation is divided either into an individual or a group subtype of motivation and there are relevant components of crowdsourcing workers' motivation determined for them in the defined two stages of crowdsourcing open innovation processes. The paper analyses the results of Internet's research that was conducted on 66 websites of CPs in 2023 and the social media they make use of. All the motivations determined in the model are used by the CPs under analysis; most of the CPs apply all the components of internalized motivation. The research results confirm that there are possible practical applications for the CPs of the motivations presented in the model.

Keywords: virtual crowdsourcing, crowd members, motivation components, voluntary work, open innovation

Introduction

Recent research suggests that crowdsourcing is an effective approach to generating open innovations. One way to involve external resources of knowledge and labor is to open up innovation processes to crowd members and motivate them to solve innovative challenges on crowdsourcing platforms (CPs) (Bakici, 2020; Moghaddam et al., 2023; Sun et al., 2023). Crowdsourcing is a production platform through which people and firms send requests and other people (i.e., the crowd) give responses. A CP connects crowd members and employs their skills and/or knowledge for the purpose of elaborating on open innovation or solving problems. Crowd members decide to contribute a potential solution in a voluntary fashion. Crowdsourcing also becomes the key new thing enabling firms to tap talent and experience from outside their boundaries (Blohm et al., 2018; Saxton et al., 2013).

The strength of CPs is that they make it possible to deliver clients value in a more efficient and effective way because crowd members can solve innovative problems faster, better, and cheaper than traditional companies could on their own. That way, online work of crowd members becomes competitive. By encouraging external innovators (i.e., relevant crowd members) to contribute to improved knowledge and new value or solutions, CPs become capable of significantly growing in size and revenue without increasing the costs of their activity at the same time. The goal for any CP is to engage a crowd that has both the willingness and ability to create new value and innovations (Blohm et al., 2018; Kohler, 2018; Lee et al., 2019).

The following research problem has been put forward in order to be solved: How to motive crowd members to participate in the development of open innovation processes

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on CPs? This is a research gap that has been identified in this paper. The proposed new idea for a two-stage open innovation process in conjunction with the framework of the Self-Determination Theory (SDT) as well as the concept of development of this model in order to adapt it to the CPs' activities all form basis for elaboration of own model of motivating crowd members on CPs, which is the purpose of this paper.

The objective of this paper is to present the model of motivating crowd members to participate in the development of open innovation processes on CPs and verify its possible applications on the existing platforms.

According to the concept of the SDT, the extrinsic, internalized, and intrinsic types of motivation are adapted and expanded in line with the needs of crowdsourcing workers. In the model proposed in this paper, each motivation type is divided into either an individual or a group subtype of motivation and there are relevant components of crowd workers' motivation determined for them in the defined two stages of a crowdsourcing open innovation process. The names of these stages are derived from the relevant actions and tasks performed during their accomplishment on CPs.

This paper contains a review of the relevant literature about the possibilities of open innovation development and research on motivating crowd members on CPs. It describes the assumptions and rules of operation of CPs, the conditions of voluntary and online work of crowd members as well as their cooperation with the contributors on the CPs (i.e., the platform managers, crowd members, clients, and external collaborators) during execution of tasks as part of open innovation processes. The paper also describes the SDT framework and possibilities of its application by CPs as well as the types of crowdsourcing workers' motivation. In line with the aforementioned objective, a model of motivating crowd members during accomplishment of the open innovation processes is developed in this paper and its practical applications by the existing CPs are verified. To perform this verification, relevant research was conducted on 66 CPs that were selected for this purpose through non-random purposive sampling via the Internet in 2023. The process was based on secondary research and observations of the platforms' websites under examination as well as the social media they make use of. Analysis of research results was carried out using descriptive statistics; it was confirmed that it is possible for the CPs under analysis to use the motivations of crowd members determined in the model for the purpose of developing open innovations in the economic practice.

Participation of crowd members in crowdsourcing open innovation

One way to involve external resources in executing open innovation processes is to open those up to the Internet's communities on CPs, which can provide companies and people with access to the results of crowdsourcing innovators' work (Bakici, 2020; Lee et al., 2019). Borders of contemporary enterprises are dissolving and innovation processes are changing from being centralized to being decentralized and from closed to open ones. Open models of innovation widely suggest using external knowledge and work resources and currently open innovations can be developed on CPs. Companies facing external competition and internal resource shortages are seeking crowdsourcing possibilities also in the form of contests to channel crowd members' knowledge, experience, and engagement into elaboration of open innovations (Chesbrough, 2012; Yin et al., 2022).

Crowdsourcing open innovation is defined as outsourcing innovative problem-solving and R&D tasks to crowd members on the Internet. In this situation, competent crowd workers ought to be motivated to be willing to generate and offer appropriate and valuable innovative solutions as well as to agree on the choice of winners from among the best solutions according to client's final expectations and decision.

Crowdsourcing contests have emerged as innovative ways to source new ideas and innovative solutions from online communities. In these contests, external incentives like monetary prizes are only awarded to winners. There is no formal contract to regulate conditions of the solvers' voluntary work or participation in CP contests. In such a competitive and voluntary context of crowdsourcing work, it is critical for a CP to motivate solvers efficiently in order to attract more effort and engagement from them (Jian et al., 2019; Liang et al., 2018; Wu et al., 2022).

Crowdsourcing workers may be professionals, that is, experts, researchers, specialists, representatives of commercial entities or universities with the relevant competences, skills, and experience in elaborating innovative projects as well as students or amateurs who decide to submit their own solutions within the framework of innovative challenges on CPs (Dolińska, 2020; 2022).

Crowd members create innovative solutions individually or co-create them in teams, networks or through mutual collaboration, communication with CP clients, other crowd members, and external partners, who are suppliers of knowledge (e.g., consultants, facilitators, patent owners, designers, specialized firms). They are engaged in anticipating evolution of markets and preferences of customers in innovation markets, presenting new values, developing new concepts, solving technological problems and R&D challenges, creating innovative solutions as well as new products or services, and even taking part in their application and commercialization. Motivating crowd members to participate and cooperate during execution of open innovation processes influences the effects of their work on CPs.

In CP contests, clients determine own orders as well as expectations and define task requirements, contest duration, and the reward. Crowd members submit proposals of new ideas and design concepts,

new products, services, and technology as own solutions to challenges put forward by the CP's clients. Voting and commenting on CPs are popular tools that are used to express crowd members' opinions or to evaluate the quality of the proposed new ideas and products or services. Clients conduct financial and marketing analyses of the proposed best solutions and decide which of them are the best candidates for implementation and/or profitable sale. Sometimes clients of CPs actively engage solvers in commercialization of the winning innovative solutions (e.g., products or services), that is, in promotion and/or selling them on the markets via online and/or physical channels (Dolińska, 2020; Pinto & dos Santos, 2018).

Crowdsourcing workers can be involved in the execution of a single task, a few tasks or all of the tasks or activities within the framework of open innovation processes: from learning about new market trends and consumers' expectations, through sharing knowledge and abilities while developing innovative ideas, to participation as solvers in elaborating new products and/or services and sometimes also in promoting and/or selling them on market. The above structure of open innovation processes serves as basis for solving the research problem determined in this paper: How to motivate crowd members to perform tasks within the framework of the stages of open innovation processes taking place on CPs?

Application of the relevant motivations by CPs should take into consideration open competition on the Internet's market as well as the conditions and constraints related to encouraging crowdsourcing workers to effective individual or group, voluntary, and online work, including their cooperation and communication with collaborators during the execution of open innovation processes, and additionally offering them expected benefits.

Motivating crowdsourcing workers and the relevant literature review

Developing and application of effective motivations to foster both participation and quality performance in crowdsourced tasks as well as expected effects of their accomplishment becomes a critical challenge for CPs (Chan et al., 2021; Chen et al., 2021; Flostrand et al., 2019; Ta et al., 2021). „In the context of crowdsourcing, studies that address the diversity of motivations which can be used in crowdsourcing innovative challenges have been relatively scarce" (Acar, 2019, p. 3).

Proper motivation of crowd members as voluntary workers has impact on the efficiency of their work and on its results, which are expected by CP clients and are also connected with achieving the aims of workers' engagement and their job satisfaction.

SDT has often been used as a main theoretical framework in studies exploring motivations of crowdsourcing workers. The assumptions of this theory of human motivation are concerned with the interrelations among different types of motivation, the impact of social environments on motivation, and how it affects human behaviors (Flostrand et al., 2019; Ryan & Deci, 2000).

The central idea of SDT is that a motivation system exists on a self-determination continuum of extrinsic vs. intrinsic motivations. Intrinsic motivation is fully self-determined and involves individuals undertaking activity because of internal forces, such as interest or enjoyment, own needs or benefits. Intrinsically motivated people feel that their effort is completely voluntary (Acar, 2019; Ryan & Deci, 2000). At the opposite end of the self-determination continuum, there are behaviors that are regulated externally and so originating from extrinsic motivation. These are activities that are undertaken to obtain something positive (such as a reward) or avoid something negative (such as punishment) (Battistella & Nonino, 2012; Ryan & Deci, 2000).

Researchers have established the importance of extrinsic and intrinsic motivations while taking into account various forms of internalized ones that exist amidst the intrinsic and extrinsic motivations and can be used on CPs (Acar, 2019; Ta et al., 2021).

Internalized motivation involves more autonomy than the extrinsic one and less autonomy than the intrinsic motivation because in this case the effort is driven not by inherent interest in certain activity but by the belief that it will somehow help achieve another personal goal which is particularly valuable for the individual and connected with the effort that may be less voluntary in nature (Acar, 2019; Ryan & Deci, 2000).

External motivations may be either winning a prize or boosting one's reputation or professional career in the context of crowdsourcing challenges and becoming a winner in a contest. Building reputation includes publicly announcing contest winners and updating their digital profiles with this information on CP websites. Non-monetary extrinsic motivations may involve enhancement of professional advantages or some future material benefits (such as a future job and higher salary opportunities) (Acar, 2019; Bakici, 2020; Moghaddam et al., 2023). SDT and literature on crowdsourcing suggest that individuals are self-determining and intrinsically motivated to engage in crowdsourcing tasks. Solvers who are highly motivated by their inner needs tend to have more desire to achieve self-fulfillment by engaging in solving innovative challenges (Feng et al., 2018; Liang et al., 2018).

Intrinsic motivations include opportunities to express individual creativity as well as pursue self-development and self-achievement, acquire new skills, organize one's own work, improve its efficacy, gain satisfaction from performing individual tasks, solve innovative challenges, belong to a group, cooperate with CP's collaborators, enjoy active participation in something or take part in fun and entertaining activities. Important intrinsic motivations are the need to show one's competences, achievements in online self-presentation, and improve self-efficacy during communication and interactions with CP's

collaborators (Acar, 2019; Battistella & Nonino, 2012; Dolińska, 2020).

The following internalized motivations could be used by CPs: clear and interesting presentation of a CP offer (e.g., products or services) and its market and/or technological achievements as well as self-marketing, participation of crowd members in sensible and creative work, exchanging valuable knowledge with collaborators, individual and collective learning, development of social capital, doing something beneficial for the people or the economy, and altruism.

Researchers highlighted the importance of financial rewards as extrinsic motivations of CP solvers (Liang et al., 2018; Zhao & Zhu, 2014). Some authors also identified and explored several intrinsic motivations involved in crowdsourcing activity and their impact on the participants' effort and appropriateness of the solutions (Feng et al., 2018; Moghaddam et al., 2023). Yan and Hollingshead (2022) as well as Moghaddam et al. (2023) examined how extrinsic motivations affect solutions to innovation problems on CPs. Other studies also presented how extrinsic and intrinsic motivations affect effort that CP solvers put in their tasks (Chan et al., 2021; Liang et al., 2018; Wu & Gong, 2021) as well as the development of crowdsourcing innovations (Battistella & Nonino, 2012).

The role of presentation of relevant information in motivating participants in crowdsourcing contests was analyzed by Yin et al. (2022) as well as Wu et al. (2022). Bakici (2020), in turn, explored social factors and motives that either increase or decrease people's intention to participate in work on CPs. Whereas research by O. A. Acar (2019) was focused on intrinsic and extrinsic motivations and analysis of the three components of internalized motivations relevant for crowdsourcing innovative challenges.

The model of motivating crowd members to participate in the development of open innovation processes in crowdsourcing

The proposed model of motivating crowd members to participate in the development of open innovation processes on CPs determines:

I. Collaborators of crowd members in open innovation processes:
   - other crowd members as individual members of the crowd and team or network partners;
   - clients of innovative solutions;
   - managers of CPs.

II. Types of crowd members' motivations according to the SDT framework: (A) extrinsic, (B) internalized, and (C) intrinsic motivations. Each motivation type is divided into (i) an individual and a (g) group subtype of motivation. Next, each type and its relevant subtypes are determined by motivation components, which can be used by CPs in the relevant stages of open innovation processes.

III. Two stages of the open innovation process on CPs, whose names are derived from the actions and tasks performed in the relevant stage.

Open innovation processes of CPs are determined in the model by the following two stages:

1. Generation and presentation of new market concepts, designing ideas, and evaluation and selection of the best (winning) innovative solution(s);
2. Elaboration of the final project of the winning innovative solution or new product or service by the solvers; contest winner(s) taking part in promotion and/or sale of those.

The following types of motivations are presented in the proposed model:

- non-financial motivation: (A) extrinsic, (B) internalized, and (C) intrinsic motivations which can be applied in the first and second stage of the open innovation process;
- financial (F) extrinsic motivations which can be used in the second (2) stage of the process under analysis.

Financial (F) motivations are determined for (i) individual crowd members or (g) groups of crowd members. The non-financial types of motivation, which can be (a) extrinsic, (B) internalized or (C) intrinsic, are divided into the following subtypes:

- (i) individual motivations of single crowd members;
- and (g) group motivations for teams/networks of crowd members.

As regards motivations of crowd members, the proposed model presents their types, subtypes, and their relevant components which can be applied in two (consecutive) stages of open innovation processes on CPs; they are provided in columns I, II, and III of Table 1.

Results of research on the possibilities of practical application of the presented model

Research on opportunities for practical application of the model proposed in this paper was conducted by the author for 66 existing CPs. This paper attempts to answer the following research question:

- Can the presented model of motivating crowd members to participate in the development of open innovation processes on CPs be used by the platforms operating on the Internet?

Most (77.27%) of the CPs under examination cooperate with individual crowd members and most of them (65.15%) also cooperate with teams and/or networks of solvers.

The results of research conducted on motivation components used by the CPs under analysis are presented (in %) in column IV of Table 1.

Table 2 presents synthesis of the final results of the research conducted on the CPs under analysis organized according to type and subtype of motivation as

Table 1

Crowd members' motivations defined for open innovation processes on crowdsourcing platforms (CPs) and results of the conducted research (in %)

I Stages of an open innovation process	II Types and subtypes of crowd members' motivations		III Motivation components which can be used on CPs	IV % of the CPs under analysis, which use the relevant motivation
(1) Generation and presentation of new market concepts, designing and evaluation of ideas, selection of the best innovative solution(s)	A. Extrinsic	i) individual	a) possibilities of improvement in professional skills; free trainings, workshops, e-handbooks b) offering free subscription to CP magazine(s), newsletter(s)	33.39% 69.70%
		g) group	a) determining clear conditions and rules of competing with other crowd members in contests b) organizing participation in execution of tasks in collective innovative projects	66.67% 46.97%
	B. Internalized	i) individual	a) promotion of innovative achievements, events, success stories on a CP's websites and its social media b) personal learning opportunities	80.30% 89.39%
		g) group	a) mutual communication and exchange of information and knowledge with other collaborators of CPs b) taking part in building social bonds with collaborators and development of the social capital on CPs	63.63% 57.58%
	C. Intrinsic	i) individual	a) possibilities of presenting information on work efficiency of contest winners b) treating execution of crowdsourcing tasks by crowd members as enjoyment, fun, and entertainment	53.03% 39.39%
		g) group	a) opportunities for cooperation with CP managers and clients, other crowd members, and external partners b) participation in the evaluation and voting to choose the best solutions along with the other crowd members	89.39% 71.21%
(2) Elaboration of the final project of the best innovative solution (or the new product or service) as well as participation in promotion and/or sale of those	F. Financial extrinsic	i) individual or g) group	a) monetary rewards for the best solutions b) free final products and/or services or reduction in their price and cash bonuses	84.85% 8.18%
	A. Extrinsic	i) individual	a) career benefits, enhancing professional reputation: presentation of the best solvers' achievements and the elaborated innovative solutions on CP's websites and/or social media b) access to specialized software in connection with solving the relevant innovative challenges	62.12% 28.79%
		g) group	a) sharing professional knowledge, experience, and abilities during co-creating of the final projects b) offering solvers the possibility to attend conferences, professional meetings or innovation events	75.76% 21.22%
	B. Internalized	i) individual	a) self-marketing: possibilities for crowd members to write a blog b) presenting own work results in CPs' case studies and publications on implemented innovations	55.09% 86.36%
		g) group	a) sharing knowledge with others during mutual and interorganizational learning b) sensible and creative work during collaboration in elaborating the final innovative projects	75.76% 84.85%
	C. Intrinsic	i) individual	a) being listed as one of the creators or winners to influence one's job satisfaction and improve professional status b) creating personal profiles by solvers on CPs	66.67% 30.30%
		g) group	a) engagement of the winning creators in selling the implemented best innovative solutions b) elaborating beneficial new solutions for the people, the society, and the economy as well as altruism	19.70% 54.55%

Source: author's own work.

Table 2
Research results (in %) per type and subtype of crowd members' motivation

Stages of an open innovation process	Type of crowd members' motivation	Arithmetic means of the results (in %) for the relevant types of motivation	Subtype of motivation	Arithmetic means of the results (in %) for relevant subtypes of motivation
(1) Generation and presentation of new market concepts, designing and evaluation of ideas, selection of the best innovative solution(s)	A. Extrinsic	54.18	i) individual	51.55
			g) group	56.82
	B. Internalized	72.73	i) individual	84.85
			g) group	60.61
	C. Intrinsic	63.26	i) individual	46.21
			g) group	80.31
(2) Generation and presentation of new market concepts, designing and evaluation of ideas, selection of the best innovative solution(s)	F. Financial extrinsic	46.52	i) individual or g) group	46.52
	A. Extrinsic	45.62	i) individual	45.46
			g) group	48.49
	B. Internalized	75.52	i) individual	70.73
			g) group	80.31
	C. Intrinsic	42.81	i) individual	48.49
			g) group	37.13

Source: author's own work.

defined in the model; they are provided in columns I, II, and III; research results for the components of motivation are shown in column IV of Table 1.

The research results presented in column IV of Table 1 prove that all the components of motivations provided in column III (Table 1) are applied by the CPs under analysis and the majority (69.23%) of them are offered by more than 50% of the platforms. Additionally, more than 50% of the CPs under examination make use of the following motivations:

1. In the first stage of open innovation processes:
   - most (69.70%) of the CPs offer crowd members extrinsic and individual motivations in the form of free subscription to magazines and newsletters;
   - most (66.67%) of the CPs under analysis use extrinsic and group motivations of determining clear conditions and rules of competing with the other crowd members in contests;
   - the vast majority of CPs make use of internalized and individual motivations, that is: (a) 80.30% of them offer promotion of crowd members' innovative also technological achievements in the form of presentation at important events or as success stories on a CP's website or its social media; (b) 89.39% of the CPs offer opportunities for personal learning;
   - internalized and group motivations are offered by most of the CPs, that is: (a) 63.63% of the CPs organize crowd members' mutual communication and exchange of information and knowledge with the other collaborators; (b) 57.58% of the CPs offer possibilities of building social bonds with the collaborators and taking part in the development of the social capital;
   - intrinsic and individual motivations (a) are used by most (53.03%) of the CPs; they put crowd members' work efficiency on display through, for example, making information on contest winners public;
   - intrinsic and group motivations are applied by the vast majority of the CPs, including (a) opportunities for acquiring new skills and raising crowd members' professional possibilities during mutual cooperation with CP users (i.e., managers, clients, other crowd members, their external partners: employees of universities, laboratories, and other firms or patent owners), which are made available by 89.39% of the CPs, and (b) participation in evaluating and voting during choosing the best innovative solutions along with the other crowd members, which is offered by 71.21% of the CPs;
2. In the second stage of open innovation processes:
   - financial (extrinsic) motivations, that is, (a) financial rewards for the best solutions, are used by the vast majority (84.85%) of the CPs;
   - extrinsic and individual motivations are offered by most (62.12%) of the CPs under examination, that is, (a) the best solvers'

careers benefit by way of enhancing their professional reputation due to presentation of their achievements and elaborated solutions on the CPs' websites and/or their social media;
- extrinsic and group motivations are used by most (75.76%) of the CPs under analysis through enabling crowd members to share knowledge, experience, and abilities during participation in co-creating of the final innovative solutions;
- internalized and individual motivations are offered by (a) most (55.09%) of the CPs in the form of arranging crowd members' self-marketing through conducting their own blogs and by (b) the vast majority (86.36%) of the CPs in the form of presentation of crowd members' work results in CP case studies and publications about the implemented innovative solutions;
- internalized and group motivations are applied by (a) most (75.76%) of the CPs under analysis through having solvers share knowledge with others as well as mutual, interorganizational learning and by (b) the vast majority (84.85%) of the CPs in the form of sensible, creative work during collaboration to carry out the final innovative projects;
- intrinsic and individual motivations are offered by most (66.67%) of the CPs through (a) putting solvers on a list of innovation creators and that way influencing their job satisfaction and growth of professional status;
- intrinsic and group motivations are used by 54.55% of the CPs by way of (b) having solvers elaborate beneficial innovative solutions for the people, the society, and the economy as well as through presentation of their altruism.

The research results in Table 2 show that all the components of internalized individual and group motivations, which were determined in the model, are used by most of the CPs under examination; they are used in the first stages by 72.73% of the CPs and in the second stages by 75.52% of the CPs. Most of the CPs under analysis apply extrinsic (over 50%), internalized (over 70%), and intrinsic (over 60%) motivations in the first stages; whereas in the second stages of open innovation processes, most of the CPs (over 70%) use internalized motivations while fewer of the CPs (over 40%) apply extrinsic and intrinsic motivations.

The components of internalized motivations are recognized by the managers of the majority of the CPs under examination as the most important ones in terms of engagement of crowd members in the execution of tasks in open innovation processes and as ones producing impact on the effects of their work, which are expected based on CP clients' orders. Practical application of internalized motivations is beneficial for the CPs as well as their employees.

The analysis that has been conducted also determines which motivation components of the proposed model are offered by the vast majority (more than 80% and less than 90% as per column IV of Table 1) of the CPs under examination and are crucial for their innovative development in the economic practice and on the competitive Internet market. These motivations (marked in the Table 1 with the symbols specified in brackets) are used in both stages of the innovation process subject to analysis: Two internalized individual motivations (Bia, Bib) and one intrinsic group motivation (Cga) are employed in the first stage; while financial (Fi/ga), internalized individual (Bib), and group (Bgb) motivations are used in the second stage of the process. These motivations are connected with individual and professional benefits enjoyed by the crowdsourcing workers, such as opportunities for personal learning, increasing innovative competences, promotion of own innovative achievements, obtaining monetary rewards offered to contest winners as well as taking part in interesting and creative work during elaboration of innovative projects.

The tasks that are executed in open innovation processes by crowd members require that they make use of their innovative skills as well as their own time, energy, and creativity but at the same time motivate them to active learning and achieving professional benefits through individual and/or team online work. Managers of the CPs offer crowd members the forms of motivations which affect their engagement in crowdsourcing work and its effects, produce possibilities of professional reputation enhancement, and take into account their job satisfaction and even entertainment connected with learning. The results of the research that has been carried out show that managers of the CPs under examination understand the impact of motivating crowd members to engage in mutual cooperation through benefits and possible achievements on global market of innovations on the Internet.

The conducted study confirms that the proposed model of motivating crowdsourcing workers is useful for CPs and the motivation components that it proposes can be applied by the CPs during the development of open innovations and in their e-businesses on competitive innovative markets.

Most other researchers focused on studying the application of extrinsic motivations, especially financial rewards (Bakici, 2020; Liang et al., 2018; Yan & Hollingshead, 2022), fewer authors investigated the application of extrinsic as well as intrinsic motivations on CPs (Acar, 2019; Battistella & Nonino, 2012; Chan et al., 2021; Feng et al., 2018; Liang et al., 2018; Moghaddam et al. 2023; Wu & Gong, 2021; Zhao & Zhu, 2014). Additionally, O. A. Acar (2019) analyzed the use of a few internalized motivations. Not many researchers focused on motivating crowd members during the process of solving innovative problems on CPs (Acar, 2019; Battistella & Nonino, 2012; Moghaddam et al., 2023; Yan & Hollingshead, 2022) and some authors analyzed motivating crowd members to participate

in contests, which are important in open innovation development on CPs (Wu et al., 2022; Yin et al., 2022; Zhao & Zhu, 2014).

There have yet been no studies that would analyze the many motivations of crowdsourcing workers in accordance with an adapted and expanded SDT framework encompassing the extrinsic, intrinsic, and, in particular, the internalized motivation types as well as, additionally, individual and group motivation subtypes and their components appearing in the two stages of the open innovation process on CPs. Furthermore, the proposed model and the research that has been carried out take into account the CPs that hold or do not hold contests in their innovative activity.

Conclusions

The model presented in this paper represents a new comprehensive approach that connects motivating crowdsourcing workers with the execution of open innovation processes on crowdsourcing platforms (CPs). Motivating crowd members enable CPs to link the expectations of the clients of open innovations with the relevant knowledge, creativity, experience, and R&D skills of online workers from all over the world.

The proposed model presents the diversity of crowd members' motivations, including their types, subtypes, and (26) components, which can be used in the defined two stages of open innovation processes on CPs.

The study that has been conducted confirms that all motivation components defined in the model are used by the CPs under examination and the majority of them are offered by more than 50% of the CPs. The vast majority of the CPs offer crowd members components of internalized motivations in the first and second stages of open innovation processes, because they can affect the effects of crowd members' work and CP activities during the development of crowdsourcing open innovations. The results of the research that has been carried out show that the presented model is suited to the current conditions of crowdsourcing work.

The final conclusion is the following: The presented model of motivating crowd members to participate in the development of open innovation processes on CPs can be applied in the economic practice. Future studies may be concerned with improving motivation system of CPs on the basis of surveys conducted on crowdsourcing solvers.

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Rafał Łabędzki

Decision making aided by Artificial Intelligence

Abstract

The aim of the paper is to present how machine learning can support managers in the decision-making process. Analysis of the issue presented in this elaboration includes a review of the relevant literature on decision theory and utility as well as machine learning methods. The paper discusses possibilities of supporting managers through artificial intelligence in the context of stages of the decision-making process. It has been demonstrated that – thanks to artificial intelligence – it is possible to better estimate the expected utility of the alternatives that decision-maker choose from. Additionally, the paper presents an argument indicating that the use of machine learning makes the manager's decision-making process closer to the normative approach.

Keywords: decision-making process, artificial intelligence, utility, machine learning, management

Introduction

This paper presents the problem of using artificial intelligence by managers aid the decision-making process. The issue is of paramount importance as advancements in artificial intelligence have the potential to significantly reduce the gap between how decisions are made in practice and how they should be made according to the normative approach.

In this context, machine learning methods serve to link the normative approach to decision-making to the descriptive one. These methods provide managers with tools to better estimate the expected utility of the available alternatives by leveraging historical data and predictive models. The literature review performed in this paper focuses on combining decision theory with artificial intelligence with the aim to explore whether the aid of artificial intelligence can align human decision-making more closely with the normative model.

The first part of the paper discusses the use of utility as a criterion for comparing alternatives, which remains a cornerstone in both normative and descriptive decision-making frameworks. Following this, the text presents selected machine learning methods that can be employed to enhance decision-making processes. The final section outlines the role of artificial intelligence in these processes.

It is important to note that while this paper considers the application of artificial intelligence in decision-making from a local perspective, focusing on specific decision-making scenarios, the broader organizational implications of artificial intelligence integration, which are crucial for ensuring coherence and stability across an enterprise, are not addressed in this text. It should be kept in mind that a systemic approach to the adoption of artificial intelligence is essential for fully realizing its potential within an organization.

Utility

In order to study decision theory, it is well worth starting with a very interesting paradox, the so-called St. Petersburg Paradox. Its history dates back to 1713 when Nicholas Bernoulli began correspondence with Pierre Remond de Montmort. The subject of their letters was the "St. Petersburg Game", which involved repeatedly tossing a coin. Each game continues until the coin lands heads for the first time. The more tosses required to end the game, the larger the payout for the player. The amount of

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the payout is determined by the formula $\$2^n$, with n being the number of instances where the toss is heads. The expected payout can be described by the following formula (Peterson, 2023):

$$\frac{1}{2}\times 2+\frac{1}{4}\times 4+\frac{1}{8}\times 8+\ldots=1+1+1+\ldots=$$
$$=\sum_{n=1}^{\infty}\left(\frac{1}{2}\right)^{n}\times 2^{n}=\infty$$

The paradox considered in the correspondence between the two distinguished mathematicians concerns the amount a player would be willing to pay for the opportunity to participate in the game. Since the expected value is theoretically infinite, would a participant pay any high amount for access? The scientists were unable to solve this puzzle for many years. It was not until 1728, when a Swiss mathematician Gabriel Cramer joined the correspondence, that a chance to find an answer emerged. Cramer proposed an innovative approach to perceiving the game's payout. According to his reasoning, a player would likely be guided by moral value rather than nominal value. In his calculations, he replaced monetary payouts with a value equal to their square root. Cramer justified his reasoning by arguing that a comparable earning for a poor person has much greater value than for a wealthy person. This approach meant that the initially infinite expected value of the game was limited to less than \$3. Independently of Cramer, in 1732, Daniel Bernoulli, cousin of Nicholas Bernoulli, presented a similar line of reasoning but more comprehensive and based on a logarithmic function. He introduced the concept of utility and marginal utility, which became the basis of all subsequent research in decision theory (Bernoulli, 1954).

Utility – as a value used to compare the outcomes of possible decisions – has survived to this day. It became the basis of utilitarianism (Mill, 1844) and, consequently, the concept of homo economicus (Ingram, 1888). In the 20th century, thanks to von Neumann and Morgenstern (1947), Samuelson (1947), and especially Savage (1954), the concept of utility was used to create a mathematical apparatus describing rational decision-making by humans. This led to the development of the SEU (Subjective Expected Utility) theory. It is called normative because it describes how decision-makers should behave rather than how they actually do. In opposition to this approach, Simon (1955; 1957) proposed the theory of bounded rationality, taking into account the limitations of humans in decision-making. This is a descriptive theory. Simon's proposal did not reject the SEU model but was a more realistic interpretation of it. He maintained the existing understanding of utility but changed the method of its application and analysis when choosing the most advantageous decision. He primarily questioned the validity of building complete sets of alternatives and the real possibility for decision-makers to evaluate expected utility. It was not until Kahneman and Tversky (1979) that the perception of utility as a function of one's current endowment was abandoned in favor of viewing it as a function of changes in that endowment (prospect theory).

In this paper, normativity is understood as the pursuit of optimal decision-making, which aligns with the principles of the rational choice theory. This approach focuses on maximizing the expected utility of decisions, thereby enhancing the economic return for the decision-maker. The use of artificial intelligence in this context is intended to overcome the cognitive limitations of human decision-makers by providing a comprehensive analysis of the possible alternatives and their associated utilities, leading to decisions that adhere more closely to the normative ideal (von Neumann & Morgenstern, 1947). Importantly, this paper does not explore the ethical or social implications of decision-making aided by artificial intelligence. While utilitarianism – as developed by Bentham (1789) and Mill (1844) – emphasizes broader societal welfare, this study remains confined to the economic dimensions of decision-making. The exclusion of moral and ethical considerations allows for a focused examination of how artificial intelligence can improve decision accuracy from a purely economic standpoint, without the added complexity of evaluating public or customer welfare.

Decision-making process

Regardless of the approach, whether normative or descriptive, making a decision involves choosing one of the available alternatives for the decision-maker. Alternatives are actions that the decision-maker has to choose from. As a result of choosing one of the alternatives, the decision-maker expects certain future states to occur. Such states occur with a certain probability. Therefore, the decision-maker expects their occurrence but is not certain of it. Of course, the probability may be 100%, and then occurrence of the event is certain. However, it may happen that the chance of a given state occurring is not known. Then, the decision-maker makes a decision under the conditions of uncertainty, not risk, as is the case when the probability of an event occurring can be determined. According to utility theory, the decision-maker chooses a certain alternative to obtain a specified utility, which is a function of future states. Therefore, it can be said that the decision-maker only indirectly decides on the occurrence of a specific state because their real goal is to achieve the utility resulting from this state (Arrow, 1951). Decision-making, understood as choosing from among the available or permissible alternatives, is an element of a model consisting of the following components:

1. Set of alternatives (A);
2. Set of permissible (considered) alternatives ($A' \subset A$);
3. Possible future states (S);
4. Utility of future states (V(s), where s is an element of S);

5. Information on which states will occur when choosing a given alternative;
6. Information on the probability of states occurring when choosing a given alternative (Simon, 1955).

Set of alternatives (A)

The set of alternatives A encompasses all possible decisions that can be made. Making a decision is, in reality, choosing one of the alternatives, that is, one element from the set A (Simon, 1955). A single decision, or one of the alternatives, can lead to many possible future states, with the cumulative probability of these states occurring being equal to one (unless the decision is made under the conditions of uncertainty). This can be illustrated with the example of tossing a coin. If the decision-maker decides to toss a coin, they are choosing a 50% chance of the coin landing heads and a 50% chance that it will land tails. Thus, one element from the set of alternatives is assigned two possible future states; each with a certain probability. It should be noted that there is another future state associated with this choice: No result. Its probability is 0% in the case of the decision to toss a coin. However, if the decision-maker decides not to toss it, then the probability of the third state is 100%. This should not be forgotten, as the decision was about tossing or not tossing the coin.

Set of permissible (considered) alternatives ($A' \subset A$)

Sometimes the decision-maker only has a subset of the set of alternatives. This means that despite there being a larger number of possible choices, only a part of them is available to this particular decision-maker. These are permissible decisions, that is, those that meet additional limiting conditions, individual to the decision-maker (Simon, 1955). Such a situation can be simply illustrated by considering the purchase of milk in a grocery store. If the person making the decision, for example, is lactose intolerant, then from a potentially large set of alternatives, where each alternative represents the choice of a particular product, they can only choose those that do not contain lactose.

Possible future states (S)

The set S contains the possible future states that can occur with a certain probability depending on the alternative chosen by the decision-maker (Simon, 1955). It is important to note that the choice is merely the act of making a decision, and future states are events that occur as a result. In the decision-making model, each future state must result from a certain choice. Similarly, every choice must produce certain future events. Therefore, choices that do not lead to any of the events in the set S are not considered. Also, there are no elements of the set S, which are not the consequence of the decision to choose one of the alternatives from set A. The number of elements in set S is independent of the number of elements in set A. In an extreme case, it may be that all alternatives lead to one outcome. A situation where there is only one element in set A is not a decision-making situation, so such an extreme case does not occur.

Utility of future states (V(s), where s is an element of S)

The key to making a decision is determining the utility of future states. A given event – an element of set S – is merely an argument of the function determining its utility. Determining utility is very difficult. However, as Bernoulli and Cramer showed, it is utility, not nominal value, that determines the choices people make. Of course, the utility function is individual for each decision-maker, but universally it is characterized by diminishing marginal utility. This means that having more and more of a given good leads to progressively smaller increases in utility. Therefore, each decision-maker can obtain different utility values for each element of the same set S. It is easy to notice that this is the reason why people make different decisions in relatively similar decision-making situations. Utility does not have to be determined by any unit. In other words, the measure of utility does not have to be equivalents of currencies or energy or other units. To make a decision, only such value is needed that allows arranging the utility arising from the elements of set S from the highest to the lowest (Simon, 1955). This type of utility is referred to as ordinal utility. However, part of the scientific community associated with the decision theory is attempting to develop a measure of cardinal utility (Arrow, 1951).

Information on which states will occur when choosing a given alternative

Set A is connected to set S through information about which elements of set A can cause certain future states, that is, elements of set S (Simon, 1955). Both a one-to-one connection, where each alternative causes only one future state, and a situation where each alternative can cause many future states are permissible.

Information on the probability of states occurring when choosing a given alternative

Considering that the decision-maker makes choices under the conditions of risk, mere information about the connection between elements of set A and elements of set S is insufficient. It is necessary to know the probability of occurrence of the elements of set S given the choice of one of the alternatives from set A (Simon, 1955). Moreover, the elements of set S associated with a given alternative must exhaust all possible states induced by it. If each of the possible future states caused by a given alternative is assigned a certain probability of occurrence, then the sum of these probabilities must equal one. This ensures that the decision-maker is certain that one of the associated future states will occur as a result of their decision. In effect, the decision-maker has the possibility of determining the probability of utility arising from the occurrence of a given state. This means that for

each of the alternatives, it is possible to calculate the expected utility value. Thus, the decision-maker can assess which alternative provides the greatest expected utility and make a choice.

Therefore, to make a decision, it is necessary to know the alternatives, determine what future states each of them can produce and with what probability, estimate the utility resulting fromoccurance of the future states, and finally choose the alternative that results in the highest expected utility. To make this possible, work needs to be done involving:

1. Gathering alternatives.
2. Determining future states and the probability of their occurrence depending on the occurrence of each alternative.
3. Assessing the utility of each state.

Each of these tasks can be extremely time-consuming. Sometimes, it may turn out that gathering only a limited number of alternatives is more reasonable; as considering all the possible ones would be unprofitable or impossible. Reaching a decision based on a detailed analysis of all the possible alternatives and their resulting expected utilities is making an optimal choice. Such an approach is characteristic of the normative approach. However, if the decision-maker has only a limited number of considered alternatives, they can still make a satisfactory (good enough) choice, as long as the alternatives are permissible. The discussion between the proponents of the normative and descriptive approaches is concerned with, among other things, whether people make optimal or good enough choices. Simon, who proposes the concept of bounded rationality, advocates that people do not consider all the possible alternatives but only a certain limited number of those. Moreover, estimating the probability of occurrence of each future state is also very difficult and questioned by Simon. Finally, estimating the utility of each element of set S seems to be an almost impossible task. Thus, the discrepancy between how people should, from a rational point of view, make decisions, and how they actually make them, is very large. It mainly arises from the capabilities that humans have (Holska, 2016). Therefore, one may ask whether, if humans had the support of artificial intelligence, their decision-making could get closer to the approach advocated in the normative stream?

To fully answer such a question, it is necessary to consider how artificial intelligence could aid humans in each of the three tasks mentioned earlier. In this paper, only one of them will be considered – determining the probability of occurrence of future states. This is a significant simplification, but it seems justified as it allows for a clear definition of the role of artificial intelligence as an entity aiding the manager. It should also be noted that an additional limitation has been applied in the form of describing the possibilities of aiding the decision-maker by artificial intelligence only in business decisions, for which the decision-maker has historical data that allow the use of machine learning for classification of or predicting the values related to the future events.

Aid of Artificial Intelligence

Artificial Intelligence

Artificial Intelligence is a field of science involved in creating computer models that simulate aspects of human thinking (Newell & Simon, 1976). One of the important branches of artificial intelligence is machine learning, which allows computers to autonomously create solutions to problems based on data (Goodfellow et al., 2016; Turing, 1950).

Having data may, but does not necessarily, enable the application of artificial intelligence. Not all data are suitable for use in machine learning. However, if a manager has data of sufficient quality, they can use artificial intelligence to answer at least two questions. The first one is: "What can be said about what there is?". The second question is: "What can be said about what there will be, based on what there is, using knowledge of what there was?".

The answer to the first question is provided by a branch of machine learning called unsupervised learning. As a result of using methods of this kind, it is possible, for example, to group the objects in the data into clusters. Such knowledge can be useful for various analyses that managers conduct (Natingga, 2018).

The second question is answered by a branch of machine learning known as supervised learning. Supervision in this group of methods means that historical data used to train artificial intelligence models contain both: 1) the parameters of the decision-making situation, which were considered when making decisions in the past, and 2) the outcome of those decisions in the form of occurrence of some states, that is, elements of set S (Boschetti & Massaron, 2015). Knowledge of which sets of parameters caused certain states in the past allows supervised machine learning to answer the question of what states might occur in the future and with what probability, depending on the parameters of the current decision-making situation. For this reason, this chapter will discuss supervised machine learning methods and their application to predicting the probability of occurrence of states from set S.

Data

Supervised machine learning is based on historical data. Since the data contain both the parameters of past decisions (further referred to as arguments collected in matrix X) and the effects of these decisions in the form of events from set S (further referred to as values collected in vector Y), it is possible to examine their interrelations and establish rules determining that for certain elements of set X, specific elements of set will Y occur (Boschetti & Massaron, 2015).

Among those working with artificial intelligence, the saying "garbage in, garbage out" is popular. If low-quality data are used to create an artificial intelligence model, then as a result, the prediction generated by such a model will be of low quality. Therefore, it is clear that high-quality data are necessary to train

a high-quality model. This means, among other things, that the data within a given set must be comparable (contain the same parameters), must be relevant from the point of view of the consequences of the decisions made, and there must be enough of them. Depending on whether artificial intelligence is used for classification or for regression, the data forming vector Y must be of an appropriate type (Boschetti & Massaron, 2015).

Machine learning models

The key concept that needs defining is a machine learning model. It can be thought of as a mathematical function that transforms input data into a prediction (Murphy, 2021). Although this is a significant generalization, it reflects reality. Machine learning is a process in which a model is created. The job of a person creating it involves selecting the appropriate type of model and then training it using data. The result should be satisfying model parameters.

There are many types of machine learning models. It is worth noting that the use of a particular model should depend on the relevant needs (Boschetti & Massaron, 2015). In the case of models that can support estimation of the probability of future events – that is, elements of set S – it seems reasonable to consider those models that enable classification. Classification involves assigning a given object to one of the predefined classes with a certain probability. For example, based on information about a customer, they can be assigned to a specific class.

Logistic regression. One of the machine learning methods that can be used for classification is logistic regression. This method allows for binary classification. Its application can result in assigning a given object to one of two classes (Natingga, 2018). If making a decision requires classification of objects into more than two groups, another type of machine learning model should be used.

It's important to note an additional benefit of using logistic regression. Among the three machine learning methods presented in this paper, logistic regression is one of the two that have interpretable parameters. This means that the trained not only classifies observations, but also provides information which of the model's parameters have the greatest significance for the predictions being created. This information is valuable both for the person developing the model and for those responsible for data collection (Natingga, 2018).

Decision tree. A decision tree is a machine learning method that, even judging by its name, seems destined for use in solving decision problems. The decision tree is a very good machine learning method that allows for classifying an object into more than two classes and even predicting values (Natingga, 2018).

Like logistic regression, a decision tree has interpretable parameters. Decision trees have a tree-like structure where each node represents a decision criterion and each edge represents the outcome of that decision. The leaves of the tree represent class labels or predicted values. The tree structure is understandable even to those without advanced statistical knowledge, which is a very important advantage of this method. As far as algorithms creating decision trees are concerned, the quality of the split is assessed based on various measures, such as information gain, for example. A decision tree makes a split according to decreasing information gain. This means that by reading a decision tree from the top, that is, from the first node, one can quickly determine which of the examined parameters are more important and which are less important from the point of view of the split (Raschka & Mirjalili, 2019).

Perceptron and neural network. Many people undoubtedly associate artificial intelligence with neural networks. A neural network is a model of artificial intelligence that, in principle, is designed to reflect the functioning of the human brain. A neural network is composed of many perceptrons. Each perceptron is a reflection of a neuron in the human brain. Perceptrons are interconnected and that way they form a neural network. Like other machine learning models, a neural network, based on input data, provides predictions both in the form of classification and specific values. A neural network can classify objects into many classes and provides information about the probability of assigning a given object to each of them (Raschka & Mirjalili, 2019).

A neural network can be used for decision-making in a similar way as the decision tree or logistic regression. Unlike them, the reasons why a neural network assigns specific objects to classes are very difficult or impossible to ascertain. Using a neural network leads only to solving the problem of predicting probability. In this case, the decision-maker or the person developing the machine learning model does not have the possibility to know the weights of specific parameters, which is not the case with the other two methods described.

It's important to note that a neural network is not inherently a better classifier than a decision tree or logistic regression. Choosing the best classifier is only possible in the context of a specific problem.

Model training

The goal of model training is to achieve satisfying parameters. In the case of models whose task is classification, the aim of training is to achieve the best possible quality of this classification. In other words, the task of the creator of a model is to select its parameters so that the model will determine the probability of assigning a given object to one of the predefined classes as accurately as possible (Raschka & Mirjalili, 2019).

Training an artificial intelligence model is a non-trivial task. As mentioned earlier, the quality of this model depends on the quality of the data available for its training. However, even assuming that there is

high-quality data available, attention should be paid to the so-called phenomenon of overtraining the model and the related issue of generalization. It may turn out that a model highly rated based on historical data makes worse predictions based on new data than a seemingly weaker model. The person working on training the model should take into account a series of important parameters that determine the value of this model for managers making decisions aided by it (Raschka & Mirjalili, 2019).

Using the model in decision making

According to DMN (i.e., Decision Model and Notation), an artificial intelligence model can be placed in a decision-making model as a source of knowledge aiding decision-making logic. The prediction provided by the model is used to choose an alternative based on the logic described in a decision table (Object Management Group, 2023).

Let an example of application of the model be a decision-making situation concerning granting a loan. To create a machine learning model in such a case, historical data are needed that contain information about two types of clients – those who repay and those who do not repay loans. The data must include both parameters characterizing the clients – matrix X – and a label assigning the client to one of the classes – vector Y. The decision-maker is the person granting the loan. The available alternatives are: 1) granting a loan and 2) not granting a loan. Possible future situations are: 1) timely repayment, 2) non-repayment, and 3) rejection of the client. The decision-making situation is illustrated by the following table.

The rows of the table present two alternative choices. Each alternative is characterized by an expected utility. The decision-maker should choose the alternative with the higher expected utility. It is assumed that the utility of states $V(s_k)$ is established. The dynamic value in the table is the probability of occurrence of the future states given the choice of a particular alternative $P(s_k | a_i)$. In the case under consideration, the probability of the third state occurring is 0% for the first alternative and 100% for the second alternative. The probability of the first and second states occurring in the case of the second alternative is 0%. However, the probability of the first and second states occurring in the case of the first alternative is not known. The artificial intelligence model can be used to determine these probabilities. Thanks to its predictions, it is possible to calculate the expected utility of the first alternative and compare it with the expected utility of the second alternative, which is constant, as it depends only on the utility of the state in which the client is rejected. As can be easily seen, a loan will only be granted in the situation where the probability of the first state occurring under the first alternative is high enough for the expected utility of the first alternative to be higher than the expected utility of the second alternative. Considering the constant values mentioned above, it is possible to determine such a level of probability of the first state occurring under the first alternative for which it will be known that it conditions the decision to grant a loan. Such a threshold value can be used to construct a decision table for which the source of knowledge will be the machine learning model.

If granting a loan requires:

1. $EV(a_1) > EV(a_2)$,
2. $\sum_{k=1}^{3} V(s_k) \times P(s_k|a_1) > \sum_{k=1}^{3} V(s_k) \times P(s_k|a_2)$,

and it is known that:

1. $P(s_3|a_1) = 0$,
2. $P(s_1|a_2) = 0$,
3. $P(s_2|a_2) = 0$,
4. $P(s_3|a_2) = 1$,
5. $P(s_1|a_1) + P(s_2|a_1) = 1$,

then:

1. $\sum_{k=1}^{3} V(s_k) \times P(s_k|a_1) > \sum_{k=1}^{3} V(s_k) \times P(s_k|a_2)$,
2. $V(s_1) \times P(s_1|a_1) + V(s_2) \times P(s_2|a_1) > V(s_3)$,
3. $V(s_1) \times P(s_1|a_1) + V(s_2) \times (1 - P(s_1|a_1)) > V(s_3)$,
4. $V(s_1) \times P(s_1|a_1) + V(s_2) - V(s_2) \times P(s_1|a_1) > V(s_3)$,
5. $P(s_1|a_1) > (V(s_3) - V(s_2)) / (V(s_1) - V(s_2))$.

Table 1
Decision to grant a loan

Alternatives (A)	Expected utility of the alternative	States (S)		
		Timely repayment (s_1)	Non-repayment (s_2)	Rejection of the client (s_3)
Granting a loan (a_1)	$EV(a_1) = \sum_{k=1}^{3} V(s_k) \times P(s_k\|a_1)$	$V(s_1) \times P(s_1\|a_1)$	$V(s_2) \times P(s_2\|a_1)$	$V(s_3) \times P(s_3\|a_1)$
Not granting a loan (a_2)	$EV(a_2) = \sum_{k=1}^{3} V(s_k) \times P(s_k\|a_2)$	$V(s_1) \times P(s_1\|a_2)$	$V(s_2) \times P(s_2\|a_2)$	$V(s_3) \times P(s_3\|a_2)$

Source: author's own work.

Therefore, there is a predefined probability level of the first state occurring under the first alternative, and if exceeded, it will prompt the choice of this particular alternative. In this specific case, it can be seen that this value is determined by the ratio of the excess of the utility of the third state over the second to the excess of the utility of the first state over the second. It is easy to see that for the decision-maker to be able to conduct business related to granting loans at all, the utility of the first state (i.e., of granting a loan) must be greater than the utility of the third state. The greater the excess of the utility of granting a loan over the state of inactivity (i.e., of the third state), the lower the threshold values for the probability of the first situation occurring under the first alternative are needed. Below is a decision table built based on the determined threshold value of the probability of the first situation occurring when deciding to grant a loan.

The decision table can be an element of decision-making logic within a decision model described according to DMN. The source of knowledge for this decision table is the artificial intelligence model, which, based on customer parameters, returns the probability of the first state occurring in the case of a decision to grant a loan.

In order to develop a decision table that cooperates with a artificial intelligence model and to use it, collaboration between humans and machines is required. Division of responsibilities within this collaboration would be as follows:

- The human is responsible for defining the set A, that is, the available or permissible alternatives;
- The human is responsible for defining the possible future states S;
- The human is responsible for assigning utility V(s) to each of the states;
- The human is responsible for defining the probability intervals for the occurrence of states from set S, which, if exceeded, trigger changes in the order of the expected utility of alternatives A.
- Artificial intelligence is responsible for providing a prediction of the probability of states (S) occurring depending on the parameters of a given decision-making situation.

As a result of such a collaboration, a manager making decisions can base them on a larger number of parameters defining the decision-making situation and better predict the expected utility than a manager without the support of artificial intelligence.

Summary

This paper considered only one of the tasks related to decision-making in the context of the possibilities of aiding decision-makers with artificial intelligence. Of course, it is worth answering the question of how artificial intelligence can aid managers in gathering alternatives and estimating utility. However, just showing how a computer can help decision-makers determine the probability of future events occurring allows us to state that with the use of artificial intelligence a manager can reduce their limitations and bring their decision-making process closer to the model proposed in the normative approach.

The example considered above (regarding a decision to grant a loan) is primarily concerned with a situation where the client initiates contact with the decision-maker. However, artificial intelligence has the potential to enhance decision-making further by proactively identifying potential clients who should be approached. Through predictive analytics, artificial intelligence can analyze vast amounts of customer data to segment and select high-value prospects, allowing organizations to take a more strategic, forward-looking approach. This proactive capability shifts the role of artificial intelligence from merely assessing those who approach the decision-maker to actively identifying and engaging potentially valuable clients before they express a need to do so.

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Table 2
Decision table

Input: $P(s_1\|a_1)$	Output
Possible inputs: $> (V(s_3) - V(s_2)) / (V(s_1) - V(s_2))$, $<= (V(s_3) - V(s_2)) / (V(s_1) - V(s_2))$	Possible outputs: Granting a loan, Not granting a loan
$> (V(s_3) - V(s_2)) / (V(s_1) - V(s_2))$	Granting a loan
$<= (V(s_3) - V(s_2)) / (V(s_1) - V(s_2))$	Not granting a loan

Source: author's own work based on *Decision Model and Notation*, Object Management Group, 2023 (https://www.omg.org/spec/DMN/1.5/Beta1/PDF).

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