Impact of Social Networks on the Labor Market Inequalities and School-to-Work Transitions

Sosyal Ağların İşgücü Piyasası Eşitsizlikleri ve Okuldan İşe Geçişlere Etkisi

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Özet

Ülkeler insan kaynağı kalitesini artırmak için eğitim sistemlerine yatırım yapmaktadır. Bu bağlamda, özellikle yükseköğretim sistemlerinin genişlemesinden sonra ülkelerin, işgücü piyasasındaki insan kaynağı kalitesini artırmak için yükseköğretimden mezun olanların oranlarını artırmaya çalıştıkları görülmektedir. Bu çabaların nihai amacı, okuldan işe geçişleri kolaylaştırmak ve işgücü piyasasının insan kaynağı ihtiyaçlarını karşılayarak toplumsal refahı artırmaktır. Okuldan işe geçişin kolaylaştırılması genç işsizlik oranlarına doğrudan etki etmektedir. Okuldan işe geçiş ilkokuldan yükseköğretime kadar sadece eğitimin kalitesi ile değil, ayrıca işgücü piyasası dinamikleri ile de doğrudan ilişkilidir. İşgücü piyasalarında istihdam dinamiklerinin anlaşılmasında sosyal ağların analizlerinin kullanılmaya başlanması, istihdamı etkileyen beşeri sermayenin ötesinde işgücü piyasasında çok sayıda başka faktörün olduğunu ortaya koymuştur. İş arama kanalları arasında özellikle eş, dost, akraba, başka bir ifadeyle sosyal çevrenin çok daha önemli olduğu görülmektedir. Bu bakımdan, işverenler işe eleman alımında formel kanalların ötesinde referans kanallarını sıklıkla kullanmaktadır. Bu kanalların, işverenler açısından hem çalışan arama maliyetini düşürdüğü hem de çalışanların işletmelerde çalışma süresini uzattığı için verimliliği de artırdığı gösterilmiştir. Dolayısıyla okuldan işe geçişin dinamiklerini anlamada sosyal ağ analizleri önemli fırsatlar sunmaktadır. Bu nedenle bu çalışmada sosyal ağ modellerinin iş piyasalarında istihdam dinamiklerini ve eşitsizlikleri anlamada sunduğu imkânlar değerlendirilmekte, ağdaki temasların istihdamda ne kadar etkili olduğu ayrıntılı olarak ele alınmaktadır. Ayrıca, sosyal ağların oluşumunda ve genişlemesinde eşitsizlikleri artıran Matta etkisi değerlendirilmektedir. Diğer taraftan, Matta etkisi kendisini işgücü piyasalarından önce eğitimde gösterdiği için eğitimdeki eşitsizliklerin temel nedenleri ve çözüm yolları üzerinde durulmaktadır. Böylece, işgücü piyasalarında eşitsizliklerin etkilerini hafifletebilmek için eğitimdeki eşitsizliklerin azaltılmasının önemi vurgulanmaktadır.

Anahtar sözcükler: Eşitsizlik, istihdam, işgücü piyasası, Matta etkisi, sosyal ağ, yükseköğretim.

Abstract

Countries invest in education systems in order to increase the quality of their human capital. In this context, it is seen that especially after the expansion of the higher education systems, countries try to increase higher education graduation rates in order to improve the quality of human resources in the labor market. The ultimate goal of these efforts is to facilitate the transitions from school-to-work, and to increase social welfare by meeting the human resources needs of the labor market. The facilitation of school-to-work transitions has a direct impact on youth unemployment. School-to-work transitions are influenced not only by the quality of education from primary to higher education but also by the dynamics of the labor market. Social network analysis can provide important insights into this dynamics, and in doing so reveal that there are indeed many factors that play a key role in determining who gets a job and why, including, first and foremost, social contacts. An analysis of job search channels reveals that partners, friends, and relatives are those social contacts that are most decisive for employment outcomes. Research reveals that employers use social-contact-based reference channels much more frequently than formal channels for recruitment. Thus, employers frequently use such reference channels in recruitment. It has also been shown that the use of social-contact channels reduces employers' costs of finding suitable employees and increases productivity since employees hired through these channels also stay longer in their firms. We here explore the full potential of social network analysis to better our understanding of school-to-work transitions, to reveal in no uncertain terms the importance of social contacts, and to show how these insights can be leveraged to level the labor market for all involved. An important take-home message is that the labor market dynamics is strongly affected by the Matthew effect, such that the inequalities and the gaps between opportunities only grow and widen as the underlying social networks evolve. It is therefore important to mitigate these effects well before school-to-work transitions come into play, namely during the education. In particular, we assert that minimizing the inequalities during education should effectively mitigate the uneven impact of social networks on school-to-work transitions.

Keywords: Employment, higher education, inequality, labor market, Matthew effect, social network.

Education systems are expected to train the human resources that modern societies need. Countries spend great efforts to ensure that their citizens benefit from education systems in order to increase their quality of human capital. Since the demand for further education increases in almost every country, the educational attendance rates increase from primary to secondary school, and from secondary school to higher education. It is noteworthy that especially after the expansion of the higher education systems, countries try to increase higher education graduation rates in order to improve the quality of human resources in the labor market. Therefore, the share of educational attainments shifts upward higher education (Blossfeld & Shavit, 1991).The ultimate goal of these efforts is to increase social welfare by facilitating the transitions from school to work.

The smooth transitions from school to work, however, are not only related to the quality of education from primary to higher education, but also to the dynamics of the labor market and the mechanisms that determine how this market functions and evolves. When this fact is ignored, it becomes increasingly difficult to understand the nature of the school-to-work transitions, the comments made are one-sided, and the sources of the problems can be misidentified (Brunila & Lundahl, 2020; Özer & Suna, 2020). However, we can also see that the standard approach to employment and wages in labor markets generally focuses on individual characteristics that aggregate into the human capital, but generally ignores the network characteristics that include social connections between individuals and companies in the labor market (Calvo-Armengol, 2006). However, social connections are as important as human capital in employment, if not more, as this work will argue and show. Therefore, evaluating the employability only from the perspective of individual characteristics does not reveal the whole picture. Indeed, it misses perhaps the most crucial part, which are the social connections that underlie the labor market and ultimately drive many aspects of employment practices.

How well do individuals with the required skills match with the relevant job positions? Are the parameters that affect employment related only to education and acquired skills? Are there other parameters that affect the matching of skills and job positions? The answers of these questions are changing frequently, and there are now many research papers and reviews available that touch upon the relations between social networks and employment. Pioneering studies were carried out by Granovetter (1973, 1974, 1982, 1985). Granovetter's model has triggered research in this area by showing that employability in the labor market is directly related to connections in social networks, that there are weak/temporary or strong/permanent connections in the network structure, and that weak links are more effective than formal channels in job research. Therefore, Granovetter played a leading role in the demonstration of latent dynamics in labor markets, as it was the first time that employability in labor markets was associated with weak and strong ties in social networks.

After Granovetter's study, many subsequent studies have been performed on exploring and understanding the employment-related characteristics of the labor markets. Therefore, social network analysis has made a significant contribution to understanding the parameters that affect employment in the labor market. Numerous channels are used to get a job in the labor market. Employee candidates try to find job positions suitable for their skills by using formal channels. Job postings, private employment agencies, direct applications or other channels are used for this purpose. It is known that researches on the effectiveness of job research methods date back to very old times (for example, Granovetter, 1973, 1974; Myers & Schultz, 1951; Rees, 1966; Rees & Shultz, 1970). Recent studies show that friends and social connections are much more effective among job research channels (Burks, Cowgill, Hoffman, & Housman, 2015; Gee, Jones, & Burke, 2017; Gür et al., 2012; Topa, 2011). In a previous study, it was found that approximately 50% of those who work in a job find their job through friends and social environment (Montgomery, 1991). Finding a job through an individual's social network is three times more efficient than the conventional research mode (Calvo-Armengol, 2006). Therefore, beyond knowledge and skills (human capital), many different factors (social capital) affect finding a job, and in this respect, search frictions occur in the labor market. Similarly, only about a third of inequalities in salaries can be explained by individual characteristics such as education, gender, and age, while the remaining is explained by search frictions in the labor market (Katz & Autor, 1999). So, in the labor market, social networks go beyond human capital: "it's not *what* you know but *who* you know is important" (Montgomery, 1991). Especially if you search for a job in the labor market of developing countries, "who you know may gain more importance than who you are" (World Bank, 2012). On the other hand, compared to young people who are in the transition from school to work, adults generally have a wider social connections and wider social networks, therefore they can find jobs more easily.

It is seen that employers use and even encourage the employees' references especially in recruitment. The study by Campbell and Marsden (1990) on 52 Indiana companies indicates that more than 51% of the job positions are filled through the reference channel. Therefore, reference channel is much more attractive for employers as it reduces both the cost of

using formal channels and the cost of evaluating job applications. When the reference of senior employees is used in the business, employees suggest people that they know the most compatible with the job in order not to have any trust problems with the employer, so the employee turnover, which is a very critical issue for businesses, decreases. As a result, this method can provide additional contributions for businesses' productivity beyond the reduction of recruitment costs (Calvo-Armengol, 2006). This contribution is reflected in the new employees' starting salary. Wage differences are also affected by the number of connections between businesses and employees (Arrow & Borzekowski, 2004). On the other hand, finding a job through connections decreases the turnover of workers and increases productivity (Burks et al., 2015).

Recently, more realistic models have been used in social networks and new expansions have been made in modeling social networks beyond the Granovetter's model (Gee et al., 2017; Hurst, 2016; Van der Leij & Goyal, 2011). Understanding the sources of differences arising from the model in social network analysis is very important in understanding employment dynamics in social networks. In this study, the contributions of Granovetter's model to understand the dynamics of employability within the labor markets are evaluated, the details of the model are discussed, and new expansions in the context of the contradictions of this model with the new social network models are reviewed in this study. In addition, by addressing the inequalities that social networks can cause in labor market, the importance of reducing inequalities at the school level is emphasized in order to minimize the inequalities in labor market within the scope of school-to-work transition.

Method

This study uses the document analysis method to examine how labor market inequalities and school-to-work transitions can be evaluated in the context of social networks. Document analysis is a systematic method that enables reaching reliable information sources such as articles, academic studies and technical reports on the subject and analyzing the information in these resources in detail (Bowen, 2009). To analyze the subject in detail, the network models introduced by both Granovetter and Montgomery are taken into consideration in the literature review on social networks. Then, the Matthew effect is introduced and its role in education is discussed. In order to provide a clear insight into the inequalities in the labor market, social network model and the Matthew effect are brought together in the light of recent characteristics in the network topology such as a preferential attachment. After making clear the picture of labor market inequalities in terms of the concepts of social net-

works, we make some suggestions to alleviate the inequalities before school-to-work transition.

Ties in Social Networks

In social networks, individuals are represented with nodes and relationships between individuals are represented with ties. The number of ties that nodes have and the strength of these ties vary depending on the network topology. Tie strength is measured by the amount of contacts between nodes. In other words, strong ties represent frequent contact, while weak ties represent rare contact. The number and strength of ties in a social network determine the flow and content of information through the network (Hurst, 2016).

In social network models based on Granovetter's approach, although the strength of ties varies according to the research context, it is generally determined by the amount of sharing between nodes (Gee et al., 2017; Montgomery, 1994; Zenou, 2015). In other words, while the high frequency of the relationship, the time spent together or the high amount of shares are considered as strong or permanent ties, the ties with much less frequent relations and shares are considered as weak or temporary ties. When weak ties are eliminated in the social network, the network structure turns into a fragmented structure consisting only of many cliques with strong ties. Therefore, the quality and quantitative structure and proportions of ties are critical for understanding the effects of social networks.

In the Granovetter model, strong ties are transitive and are used to explain the formation of groups with internally intense connections in the network structure. Accordingly, if there is a strong tie, the "my friend's friend is also my friend" is valid (Van der Leij & Goyal, 2011). On the other hand, weak ties in the network are less transitive and play an important role in bridging subgroups that are strongly connected. In other words, introverted close relationships correspond to strong ties, while extroverted friendships correspond to weak ties (Calvo-Armengol, 2006). In the model, while strong ties carry relatively limited information, the diversity of information carried by weak ties is greater because they provide contacts with different subgroups. Strong ties foster local knowledge sharing, while weak ties support dissemination of information through the network. Therefore, it is seen that weak ties in the social network shorten the distance between nodes. This effect of weak ties is also seen in the results of Granovetter (1973): 16.7% of jobs linked with a friend whom the person sees frequently (at least twice a week), while 55.6% linked with a friend they saw occasionally (more than once a year but less than twice a week). The remaining 27.8% linked with a friend whom they see rarely (once a year or less).

Social network analysis within the Granovetter's framework provides an opportunity to understand macroscopic relationships in the network. For example, a network with very few weak ties will be split into a number of separate cliques whose interactions are extremely limited (Van der Leij & Goyal, 2011). If there were no weak ties in the network, that is, if all ties were strong, then the social network, for example society would be fragmented and the information would only circulated in a narrow distance (Montgomery, 1994). Therefore, unemployment will continue to increase in networks with a high number of unemployed people due to lack of employment information. On the other hand, in networks with high employees and few weak ties, information about job opportunities will be evaluated in the network by those who do not work, and the employment ratio will increase. However, since the ratio of employees is high in these networks, employment information will be lost unless it does not lead to wage increases.

Increasing inequality in employment within a social network means that strong ties increasingly connect to individuals with the same employment status (Montgomery, 1994). As a result, while the disadvantages of those who already has disadvantages increase, the advantages of the advantageous increase. Therefore, the continuous growth of the network structure by including weak ties, may macroscopically reduce inequalities in employment relatively. In this manner, the main emphasis of Granovetter (1973) is on the importance of weak ties for increasing employment rates.

The social network model developed by Montgomery (1994) consists of many small groups and provides an opportunity to understand Granovetter's findings in more detail. In the study, it is shown that the change in the weak tie interaction rate has both productivity and distributional effects in terms of employment in the labor market. The increase in weak ties in the social network model causes a more equitable distribution in the steady-state distribution of employment, macroscopically reducing inequality. In addition, this increase rises the steady-state employment ratio of the network. In other words, as the distribution rate increases, it results in an increase in equality. When the inequality is zero (state of complete equality), the probability of an individual being employed becomes independent of the employment status of the individuals with whom that individual is strongly attached (Montgomery, 1994).

On the other hand, in the social network model created by Gee et al. (2017) using Facebook data, it is seen that most consecutive jobs are linked with weak ties. Because the emerged connections in the network model are mostly weak and people often have weak links, weak links in the network become more

important. It is also shown that as the number of contacts between two individuals increases, so as the tie between two individuals gets stronger, the probability of working in the same workplace increases. In this case, a strong tie is more important for individual wage. Therefore, when these findings in diverse studies are evaluated together, it is seen that inequality can only be minimized by reducing the effects of strong ties and increasing the effects of weak ties. Otherwise, in cliques where strong ties and introversion are dominant, interaction information about employment will be disappear rather than disseminating on the network and the employment ratio will decrease macroscopically.

In the Granovetter social network model, both an individual's employment is related to his/her position in the network and new job opportunities and his/her career depend on the network. The period of unemployment depends on the unemployment status of their friends, who are directly related, rather than their skills. The intensity of this relation increases in directly connected knits and joint action is observed in individual outputs (Calvo-Armengol, 2006). This action pattern reminds of the synchronization observed in neural networks in the brain, that is, the temporal joint motion of the neurons in the network (Erra, Velazquez, & Rosenblum, 2017; Shafiei et al., 2020). As a result, the group in the network has common fate in their employment situation, so ultimately either all of them are employed or all are unemployed (Calvo-Armengol, 2006). On the other hand, synchronization can be seen in the outputs of some subgroups, while simultaneously asynchronous output patterns can occur in other subgroups in macroscopic perspective (Calvo-Armengol & Jackson, 2004).

Another characteristic of employment dynamics in this network model is that the probability of finding a job is dependent on the duration of unemployment. For example, after a week of unemployment, the average probability of finding a job is 0.3, while it decreases to 0.08 after eight weeks and becomes 0.02 after one year of unemployment (Lynch, 1989). As individuals with whom an individual is connected on the social network become unemployed, the duration of unemployment increases, the number of connections with unemployed individuals gradually increases and the probability of finding a job decreases (Calvo-Armengol, 2006; Calvo-Armengol & Jackson, 2004). In other words, while the effect of the network is reflected on the individual, the situation of the individual affects the group to which they are directly connected, and it affects the network ultimately.

On the other hand, the strength of ties in this model can also explain the advantages and disadvantages of race and gen-

der differences in employment. For example, Zenou (2013) showed that when minority/black workers' weak ties with white workers decrease, their unemployment ratio rise. Since weak ties are important in spreading employment information, when the ratio of these ties decreases, the network becomes aware of new job opportunities only through strong ties, and the unemployment ratio increases if strong ties are unemployed (Zenou, 2015). In this context, the lack of weak ties does not just lead to an increase in the unemployment ratio, the second effect of the network comes into play and the possibility of finding a job decreases as the unemployment period increases.

As shown, the Granovetter social network model can contribute to an understanding of employment dynamics in the labor market in many different contexts. For this reason, the model that helps to understand the outputs in terms of employment has been gradually applied to different fields. It is seen that researches have focused especially on which of the ties is more important. In a study examining the ties of 136 faculty members in biological sciences departments in a university, it is shown that weak ties have a critical function, as Granovetter emphasizes (Friedkin, 1980). Weak ties are also prominent in a large network study by Onnela et al. (2007) covering mobile phone conversations.

The study conducted by Van der Leij and Goyal (2011) yield interesting results in this context. In the study investigating the co-authorship relationship in scientific articles published by economists, the strength of the ties between the two authors is associated with the number of articles they published together. Although the results of the study show that strong ties are much more transitive, as in Granovetter, it shows that strong ties are more important in reducing distance. That is, in this network structure, a contrary result has been obtained from Granovetter's finding that weak ties in a network shorten the distance. In recent studies, the emphasis on the importance of strong ties is increasing, contrary to the Granovetter model (Gee et al., 2017; Kramarz & Skans, 2014).

The Shortest Path in Social Networks

Granovetter's social network model actually points to a fundamental feature of real-life social structure: While social structure includes groups that are intensely connected by strong ties, on the other hand, these groups interact with each other through weak ties (Van der Leij & Goyal, 2011). Therefore, weak ties prevent social networks from introversion and function as a bridge between groups according to Granovetter's (1973) definition.

In fact, this topology includes features of the recently developed small-world network (Watts & Strogatz, 1998) and

scale-free network (Barabasi, Albert, & Jeong, 1999; Barabasi & Bonabeau, 2003) models that capture the dynamics of real life networks. In this network structure, there are intense small groups that are connected to each other, while the path between two nodes anywhere in the network is also shortened. The first feature is explained with the clustering coefficient, while the second is defined with the shortest path length (Watts & Strogatz, 1998). For example, in the small-world network model, the clustering coefficient has a large value while the shortest path has a small value. When these two parameter values are in this range, the network operates as a small-world network model. However, the macroscopic behavior pattern of the network changes when the parameter values are out of range.

Granovetter's model also latently reveals the importance of the shortest path in the flow of information in a network structure. Weak ties become much more important in the model because they are located more often on shortcuts in the network. The model suggests that, on the one hand, strong ties are transitive, on the other hand, weak ties are much more important in reducing the shortest path between nodes in a network. Therefore, when a weak tie is lost from the network, the path connecting multiple nodes disappears, resulting in an increase in the shortest path length.

Therefore, Montgomery (1994) showed that an increase in the weak tie interaction rate increases the employment distribution and increases the equality, and ultimately increases the employment ratio in the steady-state. Similarly, Calvo-Armengol (2006) showed that as the average path length in a network increases, total unemployment will increase. That is, as the shortest path length in a social network increases, the network loses its advantage. On the contrary, in a study conducted by Van der Leij and Goyal (2011), it is showed that strong ties become more important as they play the role of shortening the distance in the network. In fact, all these studies indicate that what is the important thing is which type of tie in a social network is more determinant in reducing the shortest path length. Therefore, the ratio of that tie will determine the macroscopic behavior of the network more and have the potential to increase equality.

Preferential Attachment and the Matthew Effect in Employment

There are two basic features in the scale-free network model (Barabasi & Bonabeau, 2003). First, the number of nodes in the network is not constant, it constantly increases. Therefore, the network is constantly growing. Second, a new node joining the

network does not randomly connect to another node in the network, but prefers to connect to the node with the most connection (preferential attachment) (Barabasi & Albert, 1999) as shown in ▋▋ Figure 1. Therefore, the model of Van der Leij and

Goyal (2011) also reflects this network structure. Senior scientists have more connections than young scientists, as the network topology reflects the hierarchy in the academy when a network is created according to the co-authorship relationship
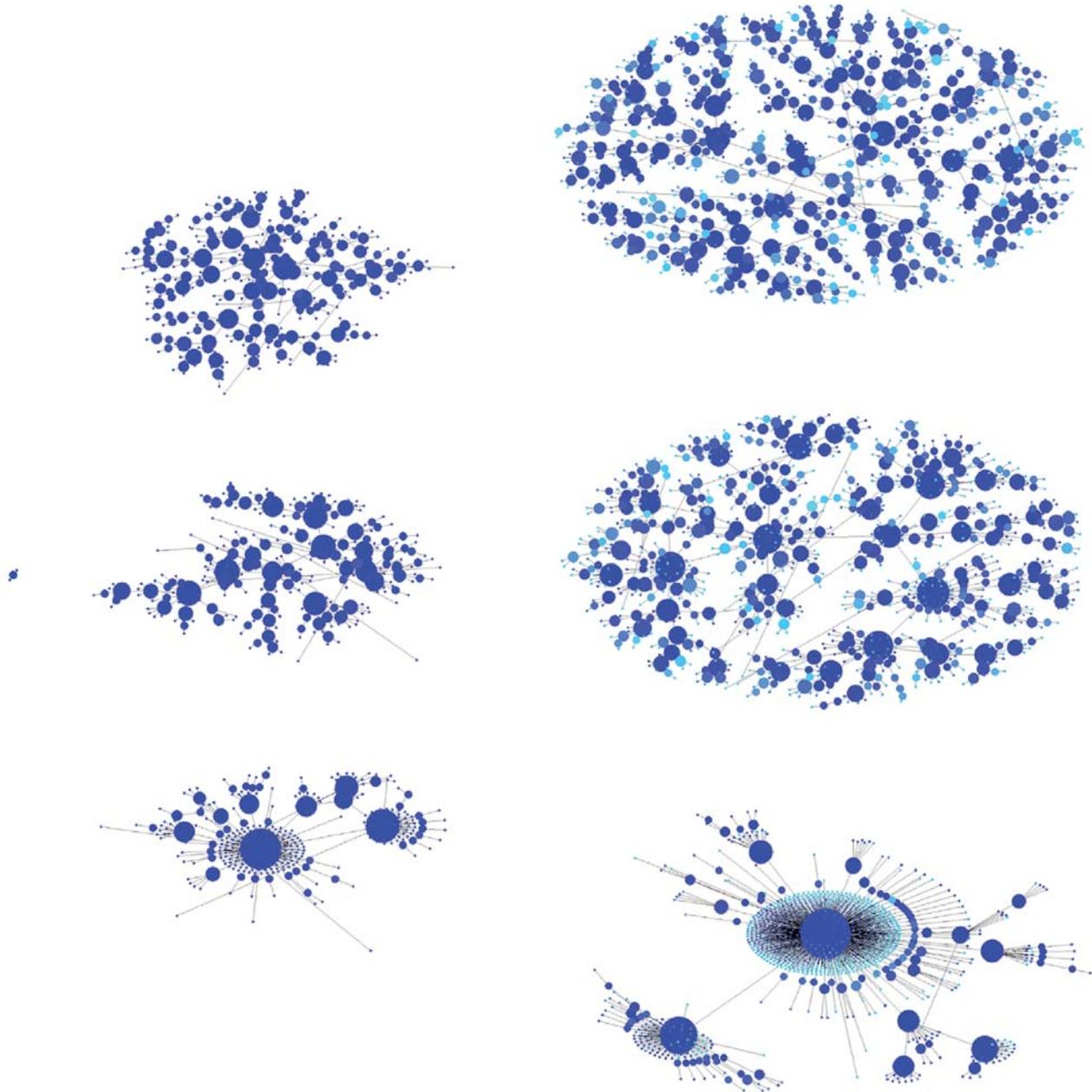
▋▋ Figure 1. Examples of social networks, growing from left to right, under different preferential attachment rules. We start with three nodes, each with a single link to one of the other nodes (small cluster on the left). Subsequently, at each time step, a new nodes arrives and it connects to an existing node with probability that is proportional to its degree. After 300 (middle) and 1000 (right) added nodes, sublinear preferential attachment yields the upper two networks, linear preferential attachment yields the middle two networks, while superlinear preferential attachment yields the lower two networks, respectively. The size and color (from cyan to blue) of the nodes correspond to their degree in log scale. The heterogeneity in node degree is clearly visible, especially for superlinear preferential attachment, where the hubs are very strong and practically connected to all the other network nodes.

in the scientific articles published by the economists mentioned earlier. In addition, since young scientist will want to connect with scientists who have more publications and more connections, there is a positive correlation between the number of connections (degree of connection) and the strength of the ties.

In this case, hub nodes emerge in the network structure as a core of the network with a very high number of connections (Van der Leij & Goyal, 2011). Therefore, connections between hub nodes are also stronger than the average nodes. As a result, strong ties shorten the distance in this type of network, hence the shortest path, as they act as a "bridge" between the many poorly connected young scientists in the network. Weak ties acting as "bridges" in the Granovetter network model also serve the same function by shortening the path. In network models with preferential attachment, the "bridge" function is performed by strong ties.

Although Montgomery (1994) established the network model in a way that confirms both of Granovetter's theses, he mentions that the employees would prefer to establish strong ties with the individuals who have a job in the network, not with the unemployed individuals, referring indirectly to the preferential attachment, in order to guarantee themselves in terms of employment. Therefore, there is somehow *preferential attachment depending on the employment status* in network. Montgomery (1994) warns that this situation will lead to a social deadlock because individuals make rational choices for themselves, but these are against well-being of the network. In this case, the steady-state employment ratio in the network decreases and inequality increases. Consequently, preferential attachment in social networks functions as an instrument that increases inequality (de Vaan & Wang, 2020).

Apparently, social networks seem to affect the future of nodes in the network. When there is an improvement in network, nodes also benefit from the advantages of this improvement. However, social network modeling studies show that the improvement is generally associated with the average improvement of the network. As Gee et al. (2017) mention, despite the average improvement or increase in the network, little is known about which network member (node) is the most profitable from this improvement.

The Matthew effect has become famous since the sociologist Robert K. Merton (1968) have referred to the Gospel of Matthew, "for all those who have, more will be given". The Matthew effect actually ensures that hub nodes with a large number of connections will have somehow more connections due to the preferential attachment (de Vaan & Wang, 2020; Perc, 2014). This effect is clearly seen especially in the dynam-

ics of scientific collaboration and bibliometric networks (Merton, 1973; Perc, 2014; Schott, 1998; Stanovich, 1986; Willis & McNamee, 1990). In education, this is obviously seen in the effects of students' socioeconomic backgrounds on their academic achievement (Özer & Perc, 2020; Reschly, 2010; Stanovich, 1986; Suna, Gür, Gelbal, & Özer, 2020a; Suna, Tanberkan, Gür, Perc, & Özer, 2020c; Walberg & Tsai, 1983). The famous American educational scientist E. D. Hirsch (2007) also uses the Matthew effect to explain the students' educational achievement from wealthy and poor families. Hirsch argues that children from wealthy families have more resources for school preparation, and these students with higher readiness level become more successful at school and they are increasingly differentiated from other students. In summary, the Matthew effect indicates that the advantageous will be more advantageous. Using social networks, Calvo-Armengol and Jackson (2004) showed that two social networks with identical economic characteristics can have significant differences in their output only due to differences in their initial states. In fact, this situation also reminds of the Matthew effect. Therefore, the relationship between the possibility of finding a job and the employment history of the individuals in the network becomes more clearly understandable in this context.

Similarly, minorities are often unemployed in initial stages. Network structures are formed to reflect the initial disadvantages, the lack of external weak ties despite having strong ties to each other causes the employment ratio to decrease (Zenou, 2013). As the employment ratio decreases, the possibility of finding new jobs among the individuals in the network decreases, ultimately, they are completely disadvantaged in the labor market and are exposed to social exclusion. Therefore, the Matthew effect emerges itself in increasing disadvantage of minorities.

If the Matthew effect is expressed in the context of preferential attachments, the number of connections of the node with the most connections (*i.e.* hub node) is more likely to increase. Hub nodes with the most connections in a network structure bring the nodes closer, thus, they keep the network together (Albert, Jeong, & Barabasi 2000). If the number of connections is expressed as a benefit, the benefits of the hub nodes will increase in this context. Therefore, the findings of Van der Leij and Goyal (2011) actually emphasize this effect. Economists who enter the network earlier have higher degrees of connectivity, and the ties between older economists in the network is also strong. It is shown that approximately 40% of the economist population is part of a large cluster that is closely interconnected with each other, and that this cluster includes all impor-

tant areas of the economy, and most importantly, the vast majority of active economists. Therefore, this cluster is the most advantageous in scientific publications. These advantages are also reflected in the citations to their publications (Perc, 2014). Young researchers who are not in the top 10% of their fields, but have publications with the most famous scientists in their fields receive more citations than their peers who do not have this experience, and even that advantage is reflected in other publications that they do not collaborated (Li, Aste, Caccioli, & Livan, 2019). This advantage in the careers of young scientists urges them to collaborate with senior scientists. As a result, benefits of hub nodes in the network become higher than others, and this increases inequality.

As the network density increases, the average unemployment decreases and the average wage increases (Ioannides & Soetevent, 2006). However, it is seen that nodes with the least connectivity benefit the least from this improvement in the network. In other words, sharing of benefits in the network is not equal. The wages of the nodes with the most connections are 15–25% higher, and the unemployment ratio of these nodes is 3–4 times lower than the unconnected individuals. Therefore, the group that establishes the core connections of the network constantly increases the scale of the network by connecting more nodes to itself. As the scale grows, the number (degree) of nodes in the core network is constantly increasing as the new connected nodes prefer to connect to the nodes with the most connections in the network (naturally a node in the core network) to increase their advantage. This characteristic in the formation of the network ultimately increases the advantages of the nodes with more connections. Although the advantage of the network increases macroscopically, the core group has the largest benefits. This characteristic of network leads to inequality in the wage distribution.

The Matthew Effect in Education

The Matthew effect manifests itself concretely in education before the transition to labor market (Hirsch, 2007). Since the school readiness of the children from socioeconomically advantageous families is much higher, this situation raises teachers' expectations of achievement leading that these students become quite successful along with other advantages in the educational environment. Children from socioeconomically disadvantaged families begin education with a disadvantage, this gap continues to widening in education levels if the education system cannot compensate it in initial steps. This problem becomes visible as achievement differences between schools in diverse countries (OECD, 2018). It eventually affects their accessibility to the

higher education, so the prestigious professions. On the other hand, during the higher education, for example friendship networks impact the academic success underlying the importance of social networks even in university environments (Stadtfeld, Vörös, Elmer, Boda, & Raabe, 2019).

Advantageous students are also more advantageous in their transition to the labor market after graduation due to their families' position in social networks and their connection advantages. Thus, the Matthew effect continues throughout life. Students from disadvantaged backgrounds face a second shock in school-to-work transition, just as they had to face difficulties at the education level. In other words, both the advantage and the disadvantage at the educational levels continue in transition to work and the inequality is gradually increasing. As a result, the initial disadvantage is reflected in the education level, when it is not compensated, the difference increases through the education levels, and it continues again in school-to-work transition. In this context, if the compensation mechanisms are not embedded within education system, education functions as an instrument that ensures the continuity of socioeconomic level differences based on the initial differences (Bourdieu, 1973; Bourdieu & Passeron, 1990).

Giving importance to social networks during the education process increases the employability of graduates. Especially in schools where students from high socioeconomic level are concentrated, school-specific organizations are established by mostly graduates of those schools. These organizations have been working for years to increase the sociocultural capital of students and support their career planning especially for higher education. On the other hand, they have contributed significantly to the increase in employability rate after graduation from higher education with reference through strong connections with labor market. In this context, it is seen that private education institutions and long-established schools are quite successful. These contributions make these schools' graduates more advantageous than their peers. In order to reduce inequalities, it is extremely important to give importance to increase the socio-cultural capital of students in all schools and especially in schools with low socioeconomic levels and to increase ties with out-of-school stakeholders.

The most critical factor in reducing the Matthew effect in education is the quality of teachers. In international student success monitoring studies such as PISA, teacher quality is seen to be the main explanatory factor of students' performance (OECD, 2018). Therefore, the steps to be taken to establish a system that continuously improves the whole process ranging from teacher candidate selection to teacher training and

appointment are critical in reducing the Matthew effect. For example, Finland has been able to reduce the impact of out-of-school factors by ensuring that all students have access to teachers with almost the same qualifications. Finland has become one of the most successful countries that have shown consistency in reducing the difference in success between schools with its strong teaching system (Sahlberg, 2011). In other words, Finland not only increased teacher qualification but also achieved a holistic improvement by following policies that ensure access to these teachers by all students regardless of their socioeconomic status. However, due to the difficulties of working conditions in disadvantaged regions in the USA, senior teachers do not want to work in schools in these regions. It is stated that the disadvantaged situation in these regions increases even more due to the employment of inexperienced and low proficiency level teachers (Darling-Hammond & Sykes, 2003). Therefore, Matthew effect shows itself in students' access to qualified teachers. As a result, the most important measure in reducing the achievement differences between schools (Matthew effect) will be a policy steps to increase the access of students to highly qualified teachers from different socioeconomic levels (Darling-Hammond, 2014; OECD, 2018; Özer, 2020e).

School tracking is a critical stage that the Matthew effect becomes prominent. Students are grouped into high school types according to their academic achievement or abilities after compulsory education in most countries. Although school tracking cluster students in different high school types according to their academic achievement, considering the effects of the socioeconomic level on academic achievement, disadvantaged students are tracked based on their socioeconomic status if their disadvantages are not compensated (Bölükbaş & Gür, 2020; Cingöz & Gür, 2020; Hanushek & Woessmann, 2006; Özer & Perc, 2020; Suna et al., 2020a, 2020c; Suna, Tanberkan & Özer, 2020d). In this way, disadvantaged students cannot participate in high-performing student communities in early school tracking (Burroughs & Plucker, 2014; Jacobs & Wolbers, 2018). Therefore, disadvantaged students often grouped in the same high school types, and consequently, the achievement differences between schools increase (Ammermüller, 2013). The probability of these students' access to higher education also decreases.

In order to reduce the effect of school tracking, it is necessary to focus on previous school experiences in addition to postponing tracking as much as possible. The socioeconomic status of the family, which is an out-of-school factor, affects the students' academic achievement, especially in the first stages of education (Marks, 2005; Reichelt, Collischon, & Eberl, 2019). When schools do not compensate for this negative impact in the early stages of education, the disadvantage gradually increase and becomes permanent especially after school tracking. At this stage, two important precautions need to be considered. First, attending preschool education is critical in reducing initial differences. For this reason, it is necessary spreading preschool education and to increase the accessibility of children of families with low socioeconomic status. The other measure is to focus to develop remedial education programs for students from a disadvantaged socioeconomic backgrounds (Gençoğlu, 2019; Özer, 2021; Özer, Gencoğlu & Suna, 2020). When both steps are implemented together, systematic support will be provided to compensate for the initial disadvantages of these children.

Discussion

We have evaluated the key parameters that affect the employment dynamics in the labor market and the inequalities in school-to-work transitions by means of the social network model. We have first reviewed Granovetter's pioneering research on the importance of weak ties in social networks. We have then outlined the limitations of these early social network models in explaining social phenomena that are crucially affected by small-world properties and heterogeneous degree distributions that are driven by the Matthew effect, which rose to prominence in the realm of network science research during the past two decades but were not sufficiently accounted for earlier. In this new context, the social networks provide more and deeper insights into the employment dynamics and inequalities of the labor market. In particular, the function and structure of social networks highlights the importance of minimizing the achievement differences between schools, which are directly related to the socioeconomic background of the students, and the outstanding importance of this for the successful mitigation of further growing inequalities during school-to-work transitions.

In order to increase their employability in various labor markets, students spend great efforts to acquire knowledge, skills, and competences during their education. Already with Granovetter's pioneering social network analysis approach, it has become evident that this alone is unfortunately insufficient to ensure employability at an appropriate -- meaning aligned with the acquired education and skill set -- job in the labor market. Research has shown that the structure of social networks and the connections between key actors are just as important, if sometimes not even more important, as the knowledge and

skills of the individual. Namely, employers that form the labor market mostly recruit new employees through reference channels that are less costly and more efficient than formal channels. Moreover, the wages of employees also vary between those who are employed through reference channels and those who are employed through formal channels. Employees who are employed through a connection can often occupy higher-level and better paid positions right at the onset, while employees that come through formal channels often have to 'work their way up' to reach the same positions and wages. As a result, the labor market promotes already inherent inequalities that are only amplified over time. In fact, as the social network grows, the inequalities grow due to the Matthew effect, which manifests itself most prominently through preferential attachment. Accordingly, while the advantageous only increase their advantage, the disadvantageous must constantly bear the burden of its disadvantage.

Studies have also shown that the probability of finding a job in the labor market depends on the duration of unemployment. In other words, the longer the unemployment period the lower the probability of finding a job. The transition from school to work is thus closely related with the position of the individual in a social network, in addition to it being related to the competencies that the individual acquired through education. However, while the competencies gained in education can be monitored, individuals are often unaware of where they are in social networks or how effective their positions are in positively affecting their career path. Perhaps this awareness is directly related to the socioeconomic level of individuals.

The smoothness of the school-to-work transition is often used as a performance indicator of education systems in meeting the demands of the labor market. For this reason, it is often postulated that the difficulties in transition from school to work are mostly associated with the gaps and deficiencies of the education system. Therefore thus the education system is predominantly considered as the area where solutions could be found and implemented. This expectation is particularly prominent in vocational education and training (VET). For example, since the problems in the transitions from school to work are considered to be predominantly associated with the quality of VET in Turkey, solutions are also expected from the VET since many years (Özer, 2018, 2019a, 2019b; Özer & Suna, 2019, 2020). However, the problems seem to be more related to the dynamics of the labor market rather than the VET itself (Özer, 2020a, 2020b, 2020c, 2020d; Suna, Tanberkan, Eroğlu, Özer, & Gür, 2020b). Worse still, as the education is held macroscopically responsible for the difficulties in school-to work transitions, the

individuals are held microscopically responsible for their unemployment. When an individual is unemployed, this is considered to be that individual's problem and inability (Brunila & Lundahl, 2020; Özer, 2020b). In other words, although the structure of social networks produces inequalities and indeed facilitate their existence, the problem is simply and often associated with individuals. Hence, individuals are constantly asked to invest more in themselves for catching the appropriate job. But if the individual somehow simply knew more about the network structure of the labor market, the benefits of this information alone, assuming of course one would then also be able to take advantage of this information, could be much higher than any form of additional education or training.

On the other hand, the difficult and often unproductive relations between the labor market and the sectors that are within the scope of VET can also be better understood in terms of the social network. In particular, the relations between VET schools and employers increase both the quality of education and the employability of VET graduates. In this context, Germany can be considered as the most successful country. In Germany, all organizations and corporations related to VET actively participate in the VET education processes, thus establishing a constantly strengthening social network between the school and the labor market. This social network increases the quality of VET, strengthens its ties with the labor market, and reduces the youth unemployment rate by facilitating school-to-work transitions (Deissinger, 2015, 2019; Özer, 2020c; Raggat, 1988; Rözer & Van de Werfhorst, 2020). This same steps taken in recent years, focusing on strengthening the relations between VET and the labor market, have been the main driving force behind the positive transformation of VET in Turkey. The active participation of the relevant sectors in the training processes is ensured in all fields of training, so that employment priorities are given to VET graduates. The network that has been established between the schools and sectors in VET is growing, and it is steadily supported by new projects. And through this growth and increasing interconnectedness, the schools transform and the confidence between VET schools and the labor market increases. As a result, we can expect that the transition of graduates to the labor market will be smoother and the unemployment will decrease.

In the context of social networks, in order to mitigate the inequalities discussed above, we conclude that policies that are very local and result-oriented will very likely be more efficient than policies that cover large areas reducing the impact of resources (Calvo-Armengol, 2006). The achievement differences between schools are increasing gradually, starting at the

preschool level and continuing towards the later stages of education, depending on the student's personal capabilities and socioeconomic status. Achievement differences between schools, in terms of aggregating over many students, do give some information as to the strength of the Matthew effect in the education system, and this does provide a viable handle to try and implement the minimization of achievement differences between schools at all levels of education, which may in turn diminish inequalities later during the school-to-work transition and make the job market a more even field for all involved. Since the Matthew effect has already shown itself in education, especially during the early stages of education, it may be viable to try and balance between the advantaged and the disadvantaged students so that the inequalities are relatively reduced or less expressed when the time comes that one enters the job market.

The precautions mentioned above thus hold the promise of contributing significantly towards reducing inequalities in the education system, and in turn also decelerating the Matthew effect, which in turn will further increase equal opportunities. In doing so, the graduates will at least compensate their disadvantages arising from their education, which should effectively mitigate also the uneven impact of social networks on school-to-work transitions.

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References

Albert, R. H., Jeong, H., & Barabasi, A. L. (2000). Error and attack tolerance of complex networks. *Nature*, *406*, 378–382.

Ammermueller, A. (2013). Institutional features of schooling systems and educational inequality: Cross-country evidence from PIRLS and PISA. *German Economic Review*, *14*(2), 190–213.

Arrow, K. J., & Borzekowski, R. (2004). *Limited network connections and the distribution of wages.* Washington, DC: U.S. Federal Reserve Board, Finance and Economics Discussion Series, No.2004-41.

Barabasi, A. L., & Albert, R. (1999). Emergence of scaling in random networks. *Science*, *286*(5439), 509–512.

Barabasi, A. L., Albert, R., & Jeong, H. (1999). Mean-field theory for scale-free random networks. *Physica A*, *272*, 173–187.

Barabasi, A. L., & Bonabeau, E. (2003). Scale-free networks. *Scientific American*, *288*(5), 60–69.

Blossfeld, H. P., & Shavit, Y. (1991). *Persistent barriers: Changes in educational opportunities in thirteen countries.* EUI Working Papers in Political and Social Sciences, SPS No.92/16.

Bourdieu, P. (1973). Cultural reproduction and social reproduction. In Brown, R. K. (Ed.) *Knowledge, educational and cultural change* (pp. 71–112). London: Tavistock.

Bourdieu, P., & Passeron, J. C. (1990). *Reproduction in education, society and culture.* London: Sage Publications.

Bowen, G. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, *9*(2), 27–40.

Bölükbaş, S., & Gür, B. S. (2020). Tracking and inequality: The results from Turkey. *International Journal of Educational Development*, *78*, Article: 102262.

Brunila, K., & Lundahl, L. (2020). *Youth on the move: Tendencies and tensions in youth policies and practices.* Helsinki: Helsinki University Press.

Burks, S. V., Cowgill, B., Hoffman, M., & Housman, M. (2015). The value of hiring through employee referrals. *Querterly Journal of Economics*, *130*(2), 805–839.

Burroughs, N. A., & Plucker, J. A. (2014). Excellence gaps. In J. A. Plucker & C. M. Callahan (Eds.), *Critical issues and practices in gifted education: What the research says* (2nd ed., pp. 255–265). Waco, TX: Profrock Press.

Calvo-Armengol, A. (2006). Social networks and labour market outcomes. *Els Opuscles del CREI*, *17*, 1-41.

Calvo-Armengol, A., & Jackson, M. O. (2004). The effects of social networks on employment and inequality. *The American Economic Review*, *94*(3), 426–454.

Campbell, K. E., & Marsden, P. V. (1990). Recruitment and selection process: The organizational side of job searches. In R. L. Breiger (Ed.). *Social mobility and social structure* (pp. 59–79). Cambridge: Cambridge University Press.

Cingöz, Z. K., & Gür, B. S. (2020). The effect of economic, social and cultural status on academic achievement a comparison of PISA 2015 and TEOG 2017 results. *İnsan ve Toplum*, *10*(4), 247–287.

Darling-Hammond, L. (2014). What can PISA tell us about U.S. education policy? *New England Journal of Public Policy*, *26*(1), 1–14.

Darling-Hammond, L., & Sykes, G. (2003). Wanted: A national teacher supply policy for education: The right way to meet the "Highly qualified teacher" challenge. *Education Policy Analysis Archives*, *11*(3), 1–53.

de Vaan, M., & Wang, D. (2020). Micro-structural foundations of network inequality: Evidence from a field experiment in professional networking. *Social Networks*, *63*, 213–230.

Deissinger, T. (2015). The German dual vocational education and training system as 'good practice'? *Local Economy*, *30*(5), 557–567.

Deissinger, T. (2019). The sustainability of the dual system approach to VET. In D. Gulle & L. Unwin (Eds.). *The Wiley handbook of vocational education and training* (pp. 293–310). Hoboken, NJ: John Wiley & Sons, Inc.

Erra, R. G., Velazquez, J. L. P., & Rosenblum, M. (2017). Neural synchronization from the perspective of non-linear dynamics. *Frontiers in Computational Neuroscience*, *11*, Article: 98.

Friedkin, N. (1980). A test of structural features of Granovetter's strength of weak ties theory. *Social Networks*, *2*, 411–422.

Gee, L. K., Jones, J., & Burke, M. (2017). Social networks and labor markets: How strong ties relate to job finding on Facebook's social networks. *Journal of Labor Market*, *35*(2), 485–518.

Gençoğlu, C. (2019). Milli bir destekleme ve yetiştirme sistemi modeli: İlkokullarda yetiştirme programı (İYEP). *Milli Eğitim Dergisi*, *48*(1), 853–881.

Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, *78*, 1360–1380.

Granovetter, M. S. (1974). *Getting a job: A study of contacts and careers.* Chicago, IL: University of Chicago Press.

Granovetter, M. S. (1982). The strength of weak ties: A network theory revisited. In P. V. Marsden & N. Lin (Eds.). *Social structure and network analysis* (pp. 105–130). Beverly Hills, CA: Sage.

Granovetter, M. S. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology*, *91*, 481–510.

Gür, B. S., Özoğlu, M., Akgeyik, T., Çetinkaya, E., Karagöl, E. T., Öztürk, M., … Çelik, Z. (2012). *Türkiye'nin insan kaynağının belirlenmesi.* Ankara: SETA Yayınları.

Hanushek, E. A., & Woessmann, L. (2006). Does educational tracking affect performance and inequality? Differences-in-differences evidence across countries. *Economic Journal*, *116*(510), C63–C76.

Hirsch, E. D. (2007). *The knowledge deficit: Closing the shocking education gap for American children.* New York, NY: Houghton Mifflin.

Hurst, J. M. (2016). *The impact of networks on unemployment.* London: Palgrave Macmillan / Springer Nature.

Ioannides, Y. M., & Soetevent, A. R. (2006). Wages and employment in a random social network with arbitrary degree distribution. *The American Economic Review*, *96*(2), 270–274.

Jacobs, B., & Wolbers, M. H. J. (2018). Inequality in top performance: An examination of cross-country variation in excellence gaps across different levels of parental socioeconomic status. *Educational Research and Evaluation*, *24*(1–2), 68–87.

Katz, L. F., & Autor, D. H. (1999). Changes in the wage structure and earnings inequality. In O. Ashenfelter & D. Card. (Eds.) *Handbook of labor economics* (Vol. *3A*, pp. 1463–1555). Amsterdam: Elsevier Science.

Kramarz, F., & Skans, O. N. (2014). When strong ties are strong: Networks and youth labour market entry. *Review of Economic Studies*, *81*(3), 1164–1200.

Li, W., Aste, T., Caccioli, F., & Livan, G. (2019). Early coauthorship with top scientists predicts success in academic careers. *Nature Communications*, *10*, Article: 5170.

Lynch, L. M. (1989). The youth labor market in the eighties: Determinants of reemployment probabilities for young men and women. *Review of Economics and Statistics*, *71*(1), 37–54.

Marks, G. N. (2005). Cross-national differences and accounting for social class inequalities in education. *International Sociology*, *20*(4), 483–505.

Merton, R. K. (1968). The Matthew effect in science. *Science*, *159*(3810), 53–63.

Merton, R. K. (1973). *The sociology of science: Theoretical and empirical investigations.* Chicago, IL: University of Chicago Press.

Montgomery, J. D. (1991). Social networks and labor-market outcomes: Towards and economic analysis. *American Economic Review*, *81*(5), 1408–1418.

Montgomery, J. D. (1994). Weak ties, employment, and inequality: An equilibrium analysis. *American Journal of Sociology*, *99*(5), 1212–1236.

Myers, C. A., & Shultz, G. P. (1951). *The dynamics of a labor market.* New York, NY: Prentice-Hall.

OECD (2018). *Effective teacher policies: Insights from PISA.* Paris: OECD Publishing.

Onnela, J. P., Saramaki, J., Hyvönen, G., Szabo, D., Lazer, K., Kaski, J., … Barabasi, A. L. (2007). Structure and tie strength in mobile communication network. *Proceedings of the National Academy of Sciences*, *104*(18), 7332–7336.

Özer, M. (2018). The 2023 Education Vision and new goals in vocational and technical education. *Journal of Higher Education and Science*, *8*(3), 425–435.

Özer, M. (2019a). Background of problems in vocational education and training and its road map to solution in Turkey's Education Vision 2023. *Journal of Higher Education and Science*, *9*(1), 1–11.

Özer, M. (2019b). Reconsidering the fundamental problems of vocational education and training in Turkey and proposed solutions for restructuring. *İstanbul Üniversitesi Sosyoloji Dergisi*, *39*(2), 1–19.

Özer, M. (2020a). *Mesleki eğitimde paradigma değişimi: Türkiye'nin mesleki eğitim ile imtihanı.* İstanbul: Maltepe Üniversitesi Kitapları.

Özer, M. (2020b). The conflict between individualist vs structural approaches for issues in the transition from school-to-work. *Bartın University Journal of Faculty of Economics and Administrative Sciences*, *11*(22), 330–345.

Özer, M. (2020c). The new factors affecting the school-to-work transition for vocational education and training: New trends in global transformation. *İnsan ve Toplum*, *10*(3), 1–27.

Özer, M. (2020d). The paradigm shift in vocational education and training in Turkey. *Gazi University Journal of Gazi Educational Faculty*, *40*(2), 357–384.

Özer, M. (2020e). What PISA tells us about performance of education systems? *Bartın University Journal of Faculty of Education*, *9*(2), 217–228.

Özer, M. (2021). A new step towards narrowing the achievement gap in Turkey: "1,000 schools in vocational education and training" Project. *Bartın University Journal of Faculty of Education*, *10*(1), 97–108.

Özer, M., & Perc, M. (2020). Dreams and realities of school tracking and vocational education, *Palgrave Communications*, *6*, 34.

Özer, M., & Suna, H. E. (2019). Future of vocational and technical education in Turkey: Solid steps taken after Education Vision 2023. *Journal of Education and Humanities*, *10*(20), 165–192.

Özer, M., & Suna, H. E. (2020). The linkage between vocational education and labor market in Turkey: Employability and skill mismatch. *Kastamonu Education Journal*, *28*(2), 558–569.

Özer, M., Gencoğlu, C., & Suna, H. E. (2020). Türkiye'de eğitimde eşitsizlikleri azaltmak için uygulanan politikalar. *Ondokuz Mayıs Üniversitesi Eğitim Fakültesi Dergisi*, *39*(2), 294–312.

Perc, M. (2014). The Matthew effect in empirical data. *Journal of Royal Society Interface*, *11*(98), 20140378.

Raggat, P. (1988). Quality control in the dual system of West Germany. *Oxford Review of Education*, *14*, 163–186.

Rees, A. (1966). Information networks in labor markets. *American Economic Review*, *56*, 559–566.

Rees, A., & Shultz, G. P. (1970). *Worker in an urban labor market.* Chicago, LA: University of Chicago Press.

Reichelt, M., Collischon, M., & Eberl, A. (2019). School tracking and its role in social reproduction: Reinforcing educational inheritance and the direct effects of social origin. *The British Journal of Sociology*, *70*(4), 1–26.

Reschly, A. (2010). Reading and school completion: Critical connections and Matta effects. *Reading & Writing Quarterly*, *26*, 67–90.

Rözer, J., & Van de Werfhorst, H. (2020). Three worlds of vocational education: Specialized and general craftsmanship in France, Germany, and The Netherlands. *European Sociological Review*, *36*(5), 780–797.

Sahlberg, P. (2011). PISA in Finland: An education miracle or an obstacle to change? *Center for Educational Policy Studies Journal*, *1*(3), 119–140.

Schott, T. (1998). Ties between center and periphery in the scientific world-system: Accumulation of rewards, dominance and self-reliance in the center. *Journal of World Systems Research*, *4*, 112–144.

Shafiei, M., Jafari, S., Parastesh, F., Özer, M., Kapitaniak, T., & Perc, M. (2020). Time delayed chemical synapses and synchronization in multi-layer neuronal networks with ephaptic inter-layer coupling. *Communications in Nonlinear Science and Numerical Simulation*, *84*, Article: 105175.

Stadtfeld, C., Vörös, A., Elmer, T., Boda, Z., & Raabe, I. J. (2019). Integration in emerging social networks explains academic failure and success. *Proceedings of the National Academy of Science*, *116*(3), 792–797.

Stanovich, K. E. (1986). Matthew effect in reading: Some consequences of individual differences in acquisition of literacy. *Reading Research Quarterly*, *21*, 360–406.

Suna, H. E., Gür, B. S., Gelbal, S., & Özer, M. (2020a). Science high school students' socioeconomic background and their preferences regarding their transition into higher education. *Yükseköğretim Dergisi*, *10*(3), 356–370.

Suna, H. E., Tanberkan, H., Eroğlu, E., Özer, M., & Gür, B. S. (2020b). Horizontal skills mismatch in vocational education in Turkey: The reasons for out-of-field employment. *İstanbul Üniversitesi Sosyoloji Dergisi*, *40*(2), 931–955.

Suna, H. E., Tanberkan, H., Gür, B. S., Perc, M., & Özer, M. (2020c). Socioeconomic status and school type as predictors of academic achievement. *Journal of Economy Culture and Society*, *61*(1), 41–64.

Suna, H. E., Tanberkan, H., & Özer, M. (2020d). Changes in literacy students in Turkey by years and school types: Performance of students in PISA applications. *Journal of Measurement and Evaluation in Education and Psychology*, *11*(1), 76–97.

Topa, G. (2011). Labor markets and referrals. In J. Benahhib, M. O. Jackson, & A. Bisin (Eds.) *Handbook of social economics* (Vol. *1*, pp. 1193–1221). Amsterdam: Elsevier.

Van der Leij, M., & Goyal, S. (2011). Strong ties in a small world. *Review of Network Economics*, *10*(2), 1–20.

Walberg, H. J., & Tsai, S. L. (1983). Matthew effects in education. *American Educational Research Journal*, *20*(3), 359–373.

Watts, D. J., & Strogatz, S. H. (1998). Collective dynamics of 'small-world' networks. *Nature*, *393*, 440–442.

Willis, C. L., & McNamee, S. J. (1990). Social networks of science and patterns of publication in leading sociology journals, 1960 to 1985. *Science Communication*, *11*, 363–381.

World Bank (2012). *World development report 2013: Jobs*. Washington, DC: World Bank.

Zenou, Y. (2013). Spatial versus social mismatch. *Journal of Urban Economics*, *74*, 113–132.

Zenou, Y. (2015). A dynamic model of weak and strong ties in the labor market. *Journal of Labor Economics*, *33*(4), 891–932.