TEXT 1:

3-D printing has undergone a three-phase evolution process. In phase one, architects, artists, and product designers used 3-D printing technology to make prototypes or mockups of new designs. Most 3-D printing still revolves around the manufacturing of prototypes and mockups.

3-D printers have several key advantages in developing prototypes and mockups, including (1) ease of duplicating products, (2) low cost, and (3) product security and privacy considerations. For example, prototypes and mockups can be produced with the same color, texture, and finish as a mass-produced product. Moreover, due to the low costs of modifying prototypes, marketers can more easily test different product versions based on customer and design feedback. According to the chief designer of Future Factories: ‘‘It’s cheap to do this stuff. It costs the same to produce two different variants as two identical ones. The economies-of-scale rationale of serial production does not apply’’ (Thilmany, 2009, p. 39). A senior CAD designer for running shoe manufacturer New Balance adds that the company’s 3-D printing machines ‘‘run pretty much nonstop.’’ Each machine produces up to 100 models a month (Pullin, 2009).

Less-expensive materials can also be used in prototype and mockup development. For example, when appearance is the major consideration, prototype parts can be produced from plastic materials and resins while the actual objects are made from metals. Prototype development costs and time requirements are also significantly reduced since no tools and dyes are required in 3-D printing. Savings in tools and dyes can result in hundreds of thousands of dollars. The manager of technology at Black & Decker reported that prior to using 3-D printers, it would typically take 3 - 5 days to get a prototype back from the service bureau. With 3-D printers onsite, however, prototypes can be produced in just a few hours (‘‘Simplifying,’’ 2010). Finally, security and privacy issues are not a concern because 3-D printing enables in-house production.

The second evolutionary phase of 3-D printers involves their use in creating finished goods. This stage is sometimes referred to as ‘direct digital manufacturing’ or ‘rapid tooling.’ A popular second phase application is larger production runs that encompass bridge manufacturing and the manufacturing of goods to be used in test marketing. In test marketing, multiple prototypes——different sizes, styles, and colors——can be more easily produced and market tested. According to Terry Wohlers, manager of a market research firm specializing in 3-D printing, over 20% of the output of 3-D printers is now in final products as opposed to prototypes (‘‘3-D Printing: The Printed World,’’ 2010). Wohlers predicts that this will rise to 50% by 2020.

In the third phase, 3-D printers will be owned and used by final consumers, just like traditional desktop laser printers. A co-founder of the firm that makes the $750 CupCake CNC 3-D printer said: ‘‘My hope is that people, instead of going to the store, will go online and download what they need and print it out’’ (Olivarez, 2010, p. C4). Arts-and-crafts applications and replacement parts are important aspects of this stage. 3-D manufacturing technology, for example, can be used to produce colorful action figures, chess pieces, and even replacement knobs for gas ranges.

According to a former technology and engineering teacher: ‘‘In the near future, we will have a desktop 3-D printer in our homes that can produce parts for our cars, computer widgets, and toaster knobs. We’ll all have factories in our homes’’ (Klaft, 2010, p. B5). Although we won’t be able to make ocean liners, we’ll be able to make the fittings. For this stage to be reached, though, the purchase price of 3-D printers will have to lower significantly. That might be just around the bend: in addition to the CupCake unit mentioned earlier, MakerBot Industries sells a hobbyist 3-D printing kit called the Thing-O-Matic for $1,299.

(http://www.sciencedirect.com/science/article/pii/S0007681311001790 - abridged)

1. According to TEXT 1, it’s correct to affirm that

a) when a 3-D printer carries out serial production, it cuts back on costs even more.
b) although risks are reduced, security keeps being a concern in 3-D printing.
c) 3-D printing has been used by marketers once it enables multiple tests at low costs.
d) specialists say that it won’t be feasible to have a 3-D printer for personal use.

2. A oração "**Although** we won't be able to make ocean liners, we'll be able to make the fittings" (último parágrafo) poderia ser reescrita, sem prejuízo de sentido, como na opção:
a) Besides not being able to make ocean liners, we won't be able to make the fittings.
b) Despite not being able to make ocean liners, we'll be able to make the fittings.
c) We won't be able to make ocean liners. Hence, we'll be able to make the fittings.
d) We won't be able to make ocean liners.Therefore, we'll be able to make the fittings.

3. The suffix ***–ing*** can be used to form verbs, nouns and adjectives. In the sentence "This stage is sometimes referred to as 'direct digital *manufacturing*'" (4th paragraph), the word *manufactoring* works as a **noun.** Which option contains the suffix –ing also forming a noun?
a) 3-D *printing* has undergone a three-phase evolution process. (1st paragraph)
b) The manager of technology at Black & Decker reported that prior to *using* 3-D printers... (3rd paragraph)
c) My hope is that people, instead of *going* to the store... (5th paragraph)
d) ...a former technology and *engineerin*g teacher...(6th paragraph)

4. "Less-expensive materials can also be used in prototype and mockup development." (3rd paragraph) implies it is
a) a particular doubt.
b) an added benefit.
c) an economy of time.
d) an industrial drawback.

5. The main idea of TEXT 1 is about
a) the evolution of 3-D printing.
b) the low costs involved in the 3-D printing process.
c) how near the popularization of 3-D printers is.
d) how prototypes and mockups are made in 3-D printers.

TEXT 2:

Advantages of 3-D Printing in Comparison to Other Technologies

- Can economically build custom products in small quantities as if mass production were used.
  Sources of cost effectiveness include:
  - No need for costly tools, molds, or punches
  - No scrap, milling, or sanding requirements
  - Automated manufacturing
  - Use of readily available supplies
  - Ability to recycle waste material
  - Minimal inventory risk as there is no unsold finished goods inventory
  - Improved working capital management as goods are paid for before being manufactured

- Ability to easily share designs and outsource manufacturing

- Speed and ease of designing and modifying products

Important 3-D Printing Applications

Small Production Run Applications of 3-D Printing

- Mass-customized products
- Prototypes
- Replacement parts
- Medical/Dental applications

Medium Production Run Applications of 3-D Printing

- Bridge manufacturing

Current Limitations of 3-D Printing

- Higher costs for large production runs relative to injection molding and other technologies
- Reduced choice for materials, colors, and surface finishes
- Lower precision relative to other technologies
- Limited strength, resistance to heat and moisture, and color stability

(Adapted from: http://www.sciencedirect.com/science/article/pii/S0007681311001790)

6. De acordo com o TEXTO II, marque a opção que enumera as vantagens da impressão em 3-D em relação a outras tecnologias.

(I) Não há necessidade de se lixar as peças produzidas.
(II) Facilidade em desenvolver e modificar produtos.
(III) Grande quantidade de cores e acabamentos.
(IV) Produção de quantidades pequenas com preço competitivo.
(V) Excelente resistência ao calor e à humidade.

a) I e II
b) I, II e IV
c) II e IV
d) II, IV e V

7. Qual das alternativas abaixo **NÃO** é mencionada no TEXTO II como uma aplicação das impressoras 3-D?

a) Aplicação na área de saúde e de construção civil.
b) Aplicação na produção de peças de substituição.
c) Aplicação na produção de protótipos.
d) Aplicação na produção de gêneros alimentícios.

TEXT 3:

One of the most significant paradigm shifts of modern business management is that individual businesses no longer compete as solely autonomous entities, but rather as supply chains. Business management has entered the era of internetwork competition. Instead of brand versus brand or store versus store, it is now suppliers—brand— store versus suppliers—brand—store, or supply chain versus supply chain. In this emerging competitive environment, the ultimate success of the single business will depend on management's ability to integrate the company's intricate network of business relationships.

Increasingly, the management of multiple relationships across the supply chain is being referred to as supply chain management (SCM). Strictly speaking, the supply chain is not a chain of businesses with one-to-one, business-to-business relationships, but a network of multiple businesses and relationships. SCM offers the opportunity to capture the synergy of intra- and intercompany integration and management. In that sense, SCM deals with total business process excellence and represents a new way of pulling off the business and relationships with other members of the supply chain.

Thus far, there has been relatively little guidance from academia, which in general has been following, rather than leading, business practice. There is a need for building theory and developing normative tools and methods for successful SCM practice. The exploratory empirical findings reported here are part of a research effort to develop a normative model to guide future research. Executives can use the model to capture the potential of successful SCM.

The Global Supply Chain Forum (GSCF), a group of non-competing firms and a team of academic researchers, has been meeting regularly for the past 6 years with the objective to improve the theory and practice of SCM. The definition of SCM as developed and used by The GSCF is as follows:

> Supply Chain Management is the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders.

This broader understanding of the SCM can be illustrated by a simplified supply chain network structure; the information and product flows; and the key supply chain business processes penetrating functional silos within the company and the various corporate silos across the supply chain. Thus, business processes become supply chain business processes linked across intra- and intercompany boundaries.

(Adapted from: http://www.sciencedirect.com/science/article/pii/S0019850199001133)

8. In TEXT 3, it is possible to find a criticism about the fact that
a) the last Global Supply Chain Forum was 6 years ago and its influence has been meager.
b) single businesses have no chance to survive in this new paradigm.
c) executives are not ready to face the challenges of SCM.
d) universities haven't been producing knowledge about effective SCM practices.

9. The phrasal verb "*pulling off*" in "and represents a new way of <u>pulling off</u> the business and relationships with other members of the supply chain" (2nd paragraph) could be replaced by
a) improving.
b) recovering.
c) managing.
d) assisting.

10. De acordo com o TEXTO 3,
a) a grande mudança na área de gestão tem sido o desaparecimento de negócios individuais.
b) ao fazer parte de uma cadeia de suprimentos, determinada empresa passa a ter maior unidade interna.
c) O GSCF tem por objetivo focar nas melhorias práticas da gestão da cadeia de suprimentos.
d) a gestão da cadeia de suprimentos parte de uma integração externa, dos fornecedores da matéria-prima até o cliente final.

GABARITO

1. c
2. b
3. a
4. b
5. a
6. b
7. d
8. d
9. c
10. d