Technology, Knowledge and Learning (2021) 26:105–122
https://doi.org/10.1007/s10758-020-09449-3

ORIGINAL RESEARCH

Social Curation Experience: Towards Authentic Learning in Preservice Teacher Training

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Published online: 27 May 2020

Abstract

The purpose of this research was to characterize the curation activity of preservice teachers practicing digital curation by constructing "knowledge exhibitions" in an academic course. Our database included 64 knowledge exhibitions on the Scoop.it platform. Factor analysis of curator's activities resulted in 3 factors, contributing 57.63% of the total variance explained: the social factor, the personal content factor and the personal process factor. Narratives of curators' reflections were analyzed using content analysis, resulting in 3 additional categories: relevance, curator activities and products. When combining the qualitative and quantitative categories, a two-dimensional conceptual model was constructed. The model illustrates a taxonomy of components that are included in the curation process, which portrays authentic learning. We conclude that curation contributes to the improvement of students' knowledge and 21st skills as curators. Curation requires personal and social skills, e.g., cognitive and meta-cognitive skills from an individual and social perspective, social skills on social media and affective skills. Hence, while focusing on personal skills in constructing an ontology, curation is also social in nature. Using social curation transforms learning, but surprisingly is uncommon in educational settings, and research is consequently meager. This highlights the need for incorporating curation as authentic learning in teacher training.

Keywords Social curation · Social media · Authentic learning · Inquiry · Preservice training

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1 Introduction

1.1 Social Curation

The origin of the term curation is in the field of arts, where digital curators establish and manage museum exhibitions. In a digital context curation refers to constructing an ontology, which is a set of beliefs that reflect the interpretation of the individual about what constitutes facts and reality altogether. This is achieved by collecting data within a specific topic or knowledge domain. Development of novel technologies broadened the term "digital curation", including two aspects. The first is digital curation, i.e., using digital tools for sorting, classifying, saving and collecting digital information sources. The second is social curation, i.e., utilization of social media for making use of digital content originated on the Internet, for construction and sharing of knowledge. Social media encourages creation and sharing of content in an online environment created for mass collaboration (Kaplan and Haenlein 2016). Social curation adds value to the digital content in the items inserted in the "knowledge exhibition", e.g., annotations or meta-data, to ensure reusability, based on the social nature of the curation process (Oliver and Harvey 2016).

Social media and the availability of new communication tools facilitate interpersonal communication, changing the nature of reciprocal relations between the individual and society (Gadot and Levin 2014). Digital curators combine handling digital information items of different types and by this—reflect their personality and social activity (Ellingwood et al. 2012). Knowledge curators tell their authentic stories through their curation process, by choosing information items and composing them into a knowledge exhibition. The digital environment enables to leverage elements such as social media for distribution of content, for proposing content or leaving comments, for evaluation etc. (Antonio et al. 2012).

The curation process produces snippets of knowledge that are connected into meaningful content, thereby examining a topic from diverse perspectives, using various resources. Social curators are learners who actively participate in content creation on social media, as a result of personal motivation for acquiring, creating and sharing knowledge. Curators construct ontologies which in turn constructs their personal content. This is termed as a "knowledge exhibition" (Gadot and Forkosh Baruch 2018). The term refers to social digital platforms that enable users to create ontologies based on sorted and integrated information items. The production of knowledge items is performed by gathering them from various online sources and adding personal input. By this, the curator creates a new entity, which reflects his or her personal story; notwithstanding, this is by nature a social process. However, although social curation is an emerging trend in several domains, e.g., humanities, arts, informatics (see for example, Leeflang et al. 2014; Poole 2017), the field of education is lagging behind. In fact, it is a new area of research and practice in educational contexts. Therefore, the contribution of social curation to educational research and to a better understanding of its potential to empower learning may be of vast importance.

1.2 Social Curation and Authentic Learning

Social media impacts our authentic experiences by shaping our social connections, the consumption of information and basically the way we define ourselves (Floridi 1995, 2014). Authentic learning is a multifaceted term prone to interpretation, ranging from

real situation-based activities to models that focus on application of knowledge and skills. It occurs mostly in authentic real life interdisciplinary scenarios learning environments, where which students are immersed, engaged and learn through their personal or social experiences (Alimisis 2019; Herrington and Oliver 2000).

Characteristics of authentic learning are complex to define, and include activities that generate engagement in defining and solving problems and involve real world relevance. They also involve of students' beliefs and values, are multidisciplinary in nature and involve various levels of difficulty or involvement (Herrington et al. 2003). This mode of learning has similarities to project-based learning, and promotes skills that are required in the digital era (e.g., Greenstein 2012; Bell 2010). These are vital for functioning in a knowledge society, in which the learner is a knowledgeable person, aiming to be a lifelong learner, to master higher-order skills and information skills, and to be able to collaborate and acquire teamwork skills (Mason and Rennie 2007; Mioduser et al. 2008).

Learners in the information age are creators who construct their own knowledge in a learning process that involves critical thinking and combines personal and collaborative learning skills as well as the ability to utilize ICT (Information and Communication Technologies) (Clarke and Boud 2018). The knowledge era conveys novel means of learning and new teaching methods, characterized by openness, collaboration and sharing of authentic knowledge production (Lewin et al. 2018), social networking, social presence, user-created content and crowdsourcing, to name a few (Dabbagh and Kitsantas 2012). These allow the utilization of meaningful learning activities in online learning environments (Wang 2009); this in turn generate a basis for authentic learning. Authentic learning seems to be a theme that is common to all subject matters (Reeves et al. 2002). Authentic activities are characterized by ten broad design features, as portrayed in Table 1.

The importance of authentic learning was identified especially when addressing 21st century skills in the information era (Bell 2010; Greenstein 2012; Ifenthaler 2017). The curation process, in which curators construct their knowledge exhibitions, is ideal for

Table 1 Authentic activities—definitions and importance

Feature	Definition/importance
Real world relevance	Learning experiences connected to real-world issues, problems, and contexts
Imprecision	Problems requiring refinement of task definitions and application of undefined solutions
Complexity of tasks	Problems requiring significant input of time and intellectual resources
Examination of different perspectives	Multifaceted activities using a variety of resources dependent on the leaner's choice and preferences
Collaboration	Problem-solving requiring combined skills and knowledge from multiple participants
Reflection on the learning	Individual and social reexamination of the learning process and outcome
Integration and application	Application of solutions across subjects and outcomes
Integration with assessment	Assessment embedded in the activity rather than separated artificially from the learning
Creation of valuable products	Stand-alone outcomes
Diversity of outcomes	Diverse activities, solutions and learning results

authentic leaning experiences (Gadot and Forkosh Baruch 2018). The curator chooses his or her own topic which is linked to his authentic milieu, collects information items that are inter-related, and creates an ontology of pre-defined content (Clarke and Boud 2018).

The knowledge construction derived from collaborative activities of individuals within a knowledge community is always better than an individual creation (Zamzami and Schiffauerova 2017). Novice curators find it relatively simple to learn and apply personal activities; however, learning and applying collaborative activities requires training (Gadot and Forkosh Baruch 2018). Moreover, the skills acquired when utilizing social curation activities are vital for graduates of the information era; for example, workers are required to apply complex thinking skills and communication skills (Zohar 2013).

1.3 Social Curation and Teacher Education

Lifelong learning that incorporates higher-order and information, collaborative and teamwork skills, indicates a paradigmatic change in education. The teacher and students are both sources of knowledge and partners in their learning process, indicating a learning process in which teachers are required to assist their students in coping with digital information (e.g., evaluate digital information) in a collaborative manner (Hatlevik and Hatlevik 2018). Consequently, transition is occurring in the educational milieu at large, from traditional to innovative pedagogy, towards a matrix-based, bi-directional structure, in which teacher and student roles undergo change. The education system welcomes learning approaches that utilize virtual platforms and environments emphasizing the role and the importance of authentic learning in which students confront real-world problems. These integrate content and process, thereby facilitating authentic learning by accessible quality content (Chen and Huang 2012).

Knowledge construction requires active learning processes, e.g., exchanging ideas, sharing resources and reflecting, all which can be reflected in teachers' use of social media (Prestridge 2019). Educators seek to broaden their accessibility to content, resources and audiences. Online collaborative platforms, specifically social media, allow the construction of personal spaces as well as accessibility to spaces of other users. This in turn stimulates meaningful learning (Tour 2017). Whether preservice teachers, in-service teachers or teacher educators, all can benefit from utilizing social media for a variety of resources and networks aimed to collaborate and curate with colleagues (Trust et al. 2016).

Preservice training is largely based on complex and continual scenarios and cases. The learners are actively engaged in authentic activities that may be used effectively in future teaching situations and technology-based experiences (Banas and York 2014). However, learners may perceive authentic online environments as flattening complexities, hence not fit for academic purposes and inefficient for learning. Only when learners comprehend the complexity and added value of these learning environments, do they see their importance in teaching and learning situations (Valtonen et al. 2015). The usage of social curation in teacher education encourages the utilization of environments which are based on knowledge construction.

The goal of our current study is to characterize the curation activity of preservice teachers who had practiced digital curation as part of their training. We examined curation as an authentic learning process. Hence, we aimed to construct a conceptual model demonstrating the curation process, including the activity patterns and learning characteristics of the curators. Consequently, the research questions were: (1) What are the characteristics of

the curator's activities? (2) What characteristics of the curator activities portray authentic learning?

2 Materials and Methods

2.1 Course Setting

The research was conducted following the preservice course "Digital Curation (academic year of (2017–2018). The "Digital Curation" course is considered an advanced-level ICT course, composed of theoretical knowledge regarding social digital curation and practical curation experience. Its key objectives were to expose students to the notion of digital curation and to provide an opportunity to utilize social curation as a learning experience, by constructing a "knowledge exhibition". This was practiced throughout the course, resulting in students' demonstration of their "knowledge exhibition". The practical aspect included construction of a knowledge exhibition on a topic chosen by participants. Finally, participants were required to write reflections regarding their learning process when constructing their knowledge exhibitions and its possible contribution of curation in schools. Reflections were submitted individually or in pairs.

2.2 Participants

Participants were preservice teachers in a college of education (N = 119), including female (n = 113) and male (n = 6), all in their 20s. The college is nationwide known for its encouragement of 21st century skills and ICT implementation in teacher training. The college is also located in a region that facilitates ICT implementation in teaching and learning. The "knowledge exhibition" database was comprised of 64 knowledge exhibitions, since the course requirements allowed students to construct them in pairs; hence, some knowledge exhibitions were constructed jointly by two students-curators.

2.3 Curation Tool

The curation tool used for authentic learning in the course was the Scoop.it platform, on http://www.scoop.it. Our choice of Scoop.it over other options was multifold. First, this platform is highly active in the academic milieu and includes several academic topics in comparison to other curation platforms, that focus mostly on personal issues. Also, Scoop.it draws professionals from the business industry. The Scoop.it algorithm automatically incorporates a data stream for the curator according to keywords and chosen resources. Hence, curators become members of a knowledge community, which is tailored according to their unique activity. The data stream constantly changes in a dynamic manner according to the activity of the community. Finally, the knowledge exhibition is presented in a visually compelling manner, enabling curator's personal contributions, such as reflections.

The curator constructs his or her personal knowledge exhibition by publishing information selected and chosen from the curation stream that the platform summons, as well as information collected from other sources. Figure 1 illustrates the Scoop.it curation platform. The items from the knowledge exhibition of one curator may serve as an input for curation streams of other curators. See illustration in Fig. 1 (identification is concealed, for ethical reasons).

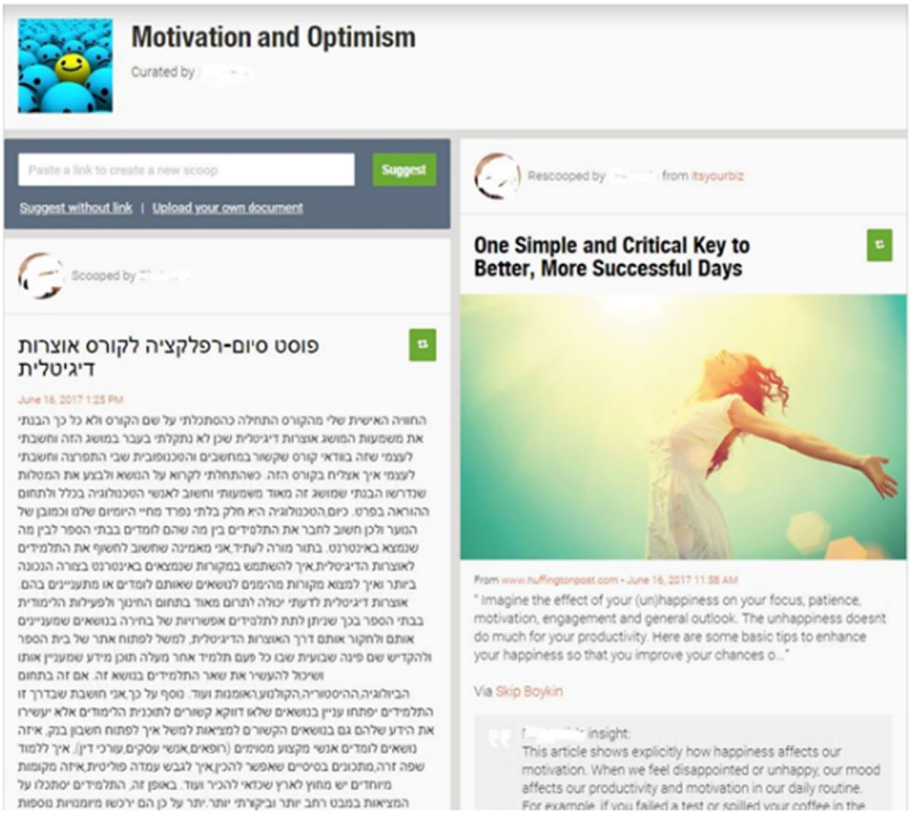

Fig. 1 Snapshot from "knowledge exhibition" of one of the students on Scoop.it

2.4 Data and Process

Data was extracted from 64 knowledge exhibitions and 46 narrative reflections of preservice teachers. Hence, we used two types of data: the knowledge exhibitions produced quantitative data, while the narrative reflections produced qualitative data. The quantitative data referred to curators' activities, and the qualitative data referred to the curators' reflections regarding the curation experience. Consequently, we achieved two sets of concepts which addressed the two dimensions of the model.

With regards to the quantitative elements, data included for each participant that characterize their curation activity while creating the knowledge exhibition. This includes set of variables; for the evaluation that are ordinal, we conducted an agreement between researchers' procedure, according to which agreement was reached for three levels, i.e., 1-low, 2-medium, 3-high.

The variables were: number of posts (10–51, $\bar{x}=22$), duration of activity period (in days, between 2 and 98, $\bar{x}=52$), sequence (1-low, 2-chunks, 3-continuous), diversity of sources (1-low, 2-medium, 3-high), diversity of media (1-low, 2-medium, 3-high), reflections (1-low, 2-medium, 3-high), reference to content (1-yes, 2-no), self-reflection (1-low, 2-medium, 3-high), re-scoop, i.e., published items from other curators (0–29, $\bar{x}=4.6$), community size (number of community members; 0–30, $\bar{x}=7$), community members

(0-none, 1-preservice teachers from the course, 2-combination of preservice teachers from the course and external members, 3-external members only), views (0–48, $\bar{x} = 14$), nature of community (0-none, 1-general expertise in social media, 2-mixed expertise, 3-content expertise), and language (1-Hebrew, 2-Hebrew-English combination, 3-English). Classification was conducted by grading variables by the two researchers until full agreement was reached.

With regards to the qualitative data, we performed content analysis of the narrative reflections (Hsieh and Shannon 2005). Data was analyzed by the two researchers in two stages: first, categories were identified separately regarding activities and aspects of the curation process, according to which initial analysis of the text was conducted. Then, a mapping analysis was performed, and the categories were refined and assigned to aspects of authentic learning.

3 Results

The results herewith include two types of data. The first type is quantitative data regarding the curators' activities, consisting of the size of the community, nature of community members (students or external), community type (professional or general), rescoop activity (original posts vs. reuse and sharing of existing posts), days of activity (number of days), the availability of curators' reflections added to the posts, curators' reference to the posts' content, sequence (frequency of curators' publishing), number of posts published by the curators, expressions of personal points of view regarding the posts, and finally—number of views of the curators' exhibitions. The second type of data consisted of qualitative data regarding the curators' narrative reflections. These included notions of their experience during the curation of the knowledge exhibitions (most students—for the first time).

Q1 What are the characteristics of the curator's activities?

The quantitative analysis was performed in order to characterize the curation activity, as well as to identify connections between these characteristics. We began by identifying correlations between the variables describing the curator's activities, in order to characterize them. The variables were ordinal in nature, hence we used a Chi^2 procedure between the 13 variables. Results show 9 significant correlations among these variables. The community type (i.e., internal–external) variable was significantly correlated to community nature (professional–general)—$Chi^2_{(df=9)} = 63.278$, community size—$Chi^2_{(df=39)} = 136.324$, and rescoop activity (original vs. post reuse)- $Chi^2_{(df=195)} = 245.958$—all $p < .0001$. Additional significant correlations were found between curators' reflections (its availability) and reflection (personal expressions)—$Chi^2_{(df=4)} = 32.276$, and also between number of posts and community size—$Chi^2_{(df=208)} = 294.859$—also $p < .0001$. A significant correlation of $p < .05$ was found between additional variables: rescoop activity and number of views $Chi^2_{(df=435)} = 487.578$, number of days of activity and community size—$Chi^2_{(df=520)} = 575.966$, and community size and community nature—$Chi^2_{(df=39)} = 69.005$. Using these correlations, we portray community traits that are central to understanding its nature. One major characteristic is the size of the community: the larger its size, the more general it is, the more activity in generates, and the more rescoops it presents. This means that the social nature of the community is more evident in these types of communities. This generates more external views, not only of community members. Additionally, since curators do not necessarily add reflections to

their posts, the more reflections are linked to published posts, the more personal reflections are evident. We learn from these correlations that the social nature of the community contributes to and enriches the curation activity.

The above activities were diverse in terms of personal versus social, as well as in terms of being focused versus general in nature. Hence, a factor analysis was performed with regards to the characteristics of the curators' activities, utilizing Varimax rotation. First, we conducted factor analysis of 13 characteristics of the curators' activities. Analysis included (a) a fixed number of factors (3, 4 and 5), (b) free analysis. In both cases findings resulted in 3 factors. Subsequently, 11 of the 13 characteristics were clearly classified into one of the three factors; hence, the 2 remaining factors were omitted from the analysis. Following this, we repeated the factor analysis (free of number of factors) for the 11 remaining characteristics of the curators' activities. Altogether, 3 factors were found, contributing 57.63% of the total variance explained, as follows: the social factor contributed 23.81% of the explained variance, the personal content factor contributed 19.6% of the explained variance, and the personal process factor contributed 14.22% of the explained variance. Results are presented in Table 2. The rows correspond to the characteristics of curators' activities, while the columns correspond to the factors produced by the factor analysis. The italics in the table mark the classification of the characteristics according to the factors, e.g., "size of community" is classified under the "social factor", while "insight added to posts" is classified under the "personal-content" factor.

The variables linked to the first factor represent theoretically the social characteristics; the variables linked to the second factor represent theoretically the personal content characteristics; the variables linked to the third factor represent theoretically the personal process characteristics. The variable "reflection", which stands for expression of emotions regarding published posts, is negatively assigned to the personal process factor. The theoretical explanation being that the participants in the study are novice curators, while the expression of emotions is a rather complex endeavor for them. Note that this variable is also moderately assigned to the personal content factor. This may be explained by the notion according to which content may have an impact on the volume of emotions, especially among novice curators.

Table 2 Factor analysis of characteristics of the curators' activities (N = 64)

Characteristics of curators' activities	Factors		
	Social	Personal-content	Personal-process
Size of community	*.734*	−.094	−.181
Nature of community members	*.728*	−.378	−.236
Community type	*.677*	−.431	−.260
Rescoop activity	*.640*	.108	.095
Days of activity	*.553*	.345	.232
Insight added to posts	.220	*.676*	−.436
Curator reference to post content	.054	*.666*	.168
Sequence of curator's publishing	.058	*.665*	.182
Number of posts	.378	.067	*.713*
Reflection	.165	.578	*−.580*
Number of views	.388	.082	*.499*

Table 3 Frequencies of the statements from narrative reflections according to social, personal-content, and personal-process factors (N = 46)

Factors	Frequencies	
	No. of statements	% of statements
Social	26	11
Personal-content	144	60
Personal-process	70	29
Total	240	100

Table 4 Frequencies of the statements from narrative reflections according to relevance, curator activities and products (N = 46)

Learning characteristics	Frequencies	
	No. of statements	% of statements
Relevance	118	48
Curator activities	18	8
Products	108	44
Total	240	100

In addition to the quantitative analysis of the curators' activities, we analyzed the narrative reflections that the preservice teachers participating in the course were required to write with relation to the curation experience. The statements were analyzed according to the 3 factors found in the factor analysis performed previously: social, personal-content, and personal-process. Frequencies of the statements are presented in Table 3. The rows correspond to the factors produced by the factor analysis, while the columns correspond to the frequencies of the statements in the curators' narrative reflections.

According to the data related to the curators' activities, in spite of the fact that the social factor was the highest contributor to the explained variance (23.81% of the 57.63%), the number of statements related to this factor was the lowest (including only 11% of the total statements). The most frequent factor found in the narrative reflections was the personal-content one, referring to the content aspect of the posts published in their knowledge exhibition.

Q2 What characteristics of the curator activities portray authentic learning?

The narratives were also analyzed using content analysis, according to learning characteristics. Consequently, 3 categories were identified, linking statements to the authentic activities characteristics model: relevance, curator activities and products. Frequencies of the statements are presented in Table 4. The rows correspond to the learning characteristics produced by the content analysis of the narrative reflections, while the columns correspond to the frequencies of the statements in the curators' narrative reflections.

We present herewith the students' statements related to each of the categories. Statements were analyzed separately by both researchers, to ensure the objectivity and reliability of the coding, then checked jointly to reach full agreement. The letters in brackets for each statement stands for the first and surname of the student.

The largest category was the relevance category, including issues related to interdisciplinary learning, real-world relevance, vaguely-defined queries and multiple sources and

perspectives; all these, when addressed by the learners, develop their independent learning, as portrayed by the following examples:

> …an independent learner who is willing and able to take upon himself learning of any topic by himself, to a degree of mastery. (OG);
>
> We believe that a person needs to acquire the ability to curate so he can expand his horizons, enrich his knowledge and validate it. (OG)

Some statements refer specifically to opportunities for learning, e.g.,

> Digital curation occurs all the time, even if we aren't aware of it, in learning, in social networks and in search of various information on the Internet. This is why it is a very important topic which is important to pass on to students and warn them that not all information on the Internet is credible. (OC)

The authenticity of the curation is described as by another participant:

> Digital curation connects the students' education, for strengthening his awareness to the learned materials. (LS)

Preservice teachers cope with vaguely-defined problems regularly, which illustrate yet another aspect of the relevance category, for example:

> …by personal assignments for each student, which choses a topic that intrigues and expresses using different sources… this way we give the student motivation to search for more information and to enrich the topic that interests him. (JE).

Students expressed a feeling of looking for a needle in a haystack, e.g.,

> During the curation process… I understood that digital curation is an important tool that needs to be used carefully, since the amount of information that can be found is huge; therefore, we need to be precise in the search of information and need preparation for it… in order to pinpoint the specific subject. (LF)

Digital curation can also serve as a means to examine different facets of contemporary issues:

> Digital curation develops a personal opinion… once he decides the type of information he wants; this means that he needs to think what kind of knowledge is relevant for him or interests him more… (NR)

Relevance also includes multiple sources and perspectives, e.g.,

> It's important to look at things from different angles, from different sources so that our information will be more established and credible. (JE)
>
> in a world in which the amount of information is huge, digital curation teaches diagnosis of information, search and comparison between contents and organization of the relevant information. (OC)

They acknowledge that

> …social digital curation is important to collect the important and credible information and to stimulate critical thinking about the information spread on the Internet. (OC)

Regarding diverse opinions, they elaborate that

> In an era in which the Internet asks and all people in society see themselves as having individual thinking… the solution is simple: to come and present your opinion strengthened by someplace on the Internet… so that people will know that there is a whole load of opinions out there and so they know how to cope with them and not to take them for granted. (MA)

The second largest category focused on the curator's activities, and included aspects related to self-reflection, collaboration and problems that require prolonged investigation and examination of sources.

Preservice teachers reflected upon their experience during the curation process, e.g.,

> I'm happy that I managed to refine the array of videos and articles I saw to a reduced number of links that are, to my mind, the ones of the highest quality and the most adequate. (AS)

They stated that

> Learning in the course was meaningful to me, and gave me efficient tools for independent learning, for teaching and, of course, for digital curation. (EL)

They also referred to the contribution of the curation activity to the curator:

> The curation process can assist students to develop self-confidence and to improve their self-expression. (ST)

Students also appreciated the opportunity to join forces and collaborate, for example:

> The curation was an interesting personal process which allowed me to be exposed to others with the same field of interest, to hear their opinions about related topics and to view the topic in a wide and varied manner. (MM)

They also mentioned the possibility to share knowledge online:

> The digital curation method allows each and everyone in the technological era to share their knowledge with the network at large. (ST)

It also allows individuals to reach heights that were formerly out of reach:

> The posts nowadays are considered in social networks as penetrating 'glass ceilings' of the literature and writing field, when not every writer would succeed to publish his writings, and these posts have begun to create within social networks a place for expression, a place for writing stories, poems, opinions, personal experiences and such. (SG)

Problems that require prolonged investigation and examination of sources refer to challenges of the curation activity, for example:

> On the Internet the amount of presented information is infinite and not all information is relevant of precise therefore in order to assemble a full picture we need to perform a small research initiative and to classify the required information among all chosen results presented to us. (BB)

> In order to overcome the difficulty I had to do serious research and to confront a lot of information to reach reliable websites which contain quality based information… I reached fascinating websites and wonderful videos which empowered the

> existing information and created a fascinating collage of information which can be stand-alone but also together creates a whole picture. (SP).

Participants emphasized that their actions and not technology in itself is fundamental:

> I learned that digital curation is created by the individual, who examines and screens what is appropriate for adding to the digital curation [platform]. This process is utilized by human judgement skills alone. Only a human can decide and filter [information] using expanded thinking and recognition of the chosen field, what is appropriate for publication and what isn't, what can add and influence learning and what needs to be filtered and not published online. (SO).

The third category contained statements related to authentic products, which are meaningful and valuable, e.g.,

> to supply valuable knowledge to the community… The activities of the curator are addition of value and meaning to the information. (CA)

> Collection of information and its arrangement in a certain way… will bring about the creation of a collection that may be vital for many years, depending on the topic and its relevance for a sustainable period. (MOO).

Some participants refer to a variety of data presentation and information sources that compose the product, e.g.,

> I found out that through the Scoop.it task that it is a useful and excellent way to upload varied educational content in an unconventional way as opposed to dictating materials in class and summarizing, rather by integrating videos, articles and photos. (EL).

4 The Model

To sum, when combining the quantitative (i.e., curators' activities in their knowledge exhibitions) and qualitative (i.e., curators' narrative reflections on their curation experience) data analysis, we constructed a two-dimensional model. The model describes the authentic learning characteristics and how they are linked to the curators' activity patterns. Our new proposed conceptual model presented in Table 5 in fact illustrates a taxonomy of components that are included in the curation process as authentic learning. The rows correspond to the learning characteristics produced by the content analysis of the narrative reflections, while the columns correspond to the factors produced by the factor analysis. The cells of the table represent our new proposed classification of the authentic activities characterized by design features, which are based on the authentic learning model presented by Reeves et al. (2002).

In the first row of the model, at the intersection of the relevance row and the content column, we assigned interdisciplinary learning experiences and relevance of the learning to real-world practice, since contemporary content is in fact a combination of more than one subject matter, and related to authentic, real-world experiences. At the intersection of the relevance row and the process column, we included vaguely-defined problems and problems requiring prolonged inquiry and examining sources. The intersection of relevance and social experience was not stressed in the Reeves et al. (2002) model. Our contribution is based on the importance and relevance of the social aspect of learning, as emphasized

Table 5 Conceptual model of the curation process as authentic learning

Learning characteristics	Activity patterns				
	Content		Process		Social
Relevance	Interdisciplinary	Relevance to real world	Vaguely-defined problems	Problems requiring prolonged inquiry and examining sources	NA
Curator activities	Multiple sources and viewpoints		Self-reflection		Collaboration
Products	Authentic meaningful outputs		NA		NA

in the concept of digital social curation. However, since our preservice students were all novice curators, this cell was classified as Not Available (NA), that is—no evidence of this intersection in our current data. Notwithstanding, there is evidence of this intersection when referring to expert curators (Gadot 2017).

The second row of the model refers to activities of the curator. Curator activities' intersection with content results in utilization of multiple sources and viewpoints; the intersection with the process column produces self-reflection, which is an individual act and an integral component of curation as a dynamic endeavor. The intersection of curator activities and the social component results naturally in collaboration. In the third row, product in terms of content result in authentic meaningful outputs, i.e., the curated knowledge exhibitions. However, products in our model may be classified also in terms of process and social aspects. Again, their absence may be a result of preservice teachers being novice curators.

The model illustrates a taxonomy that presents a gradual process, in which the curation is developed into a more complex endeavor in the two dimensions: the activity patterns and the learning characteristics. The taxonomy is expressed in the intersection between these two dimensions. Movement in a diagonal direction towards the lower right side of the model shows high levels of complexity and proficiency in the curation process, which represents authentic learning.

5 Discussion

This study examines curation as an authentic learning process of preservice teachers in a course titled "Digital Curation". Digital curation is considered key to knowledge construction and authentic learning in the information era. In this article we discuss its relevance to educational contexts. By utilizing the curation process in digital contexts, the user establishes a literacy that is vital for effective functioning in media-saturated environments. Teachers are therefore encouraged to utilize curation for teaching and learning (Ungerer 2016). Our study examined preservice teachers' social digital curation experiences on the Scoop.it platform, specifically with regards to authentic learning. We focused on their activity patterns and learning characteristics as social curators; in this respect, as future teachers, the utilization of social curation in teaching and learning may allow implementation of novel pedagogic paradigms.

Digital curation is a learning activity that requires the utilization of strategies that are characterized by their social nature, and by their critical learning nature e.g., critical reading for better understanding of the meaning of the information (Tseng et al. 2018). This entails organizing the "knowledge exhibition" in a coherent and cohesive structure, and provides opportunities for deep learning. However, contemporary behavior is characterized by immediacy and rapidness, e.g., books such as "Philosophy in Five Minutes", fast food and such. Some textbooks even summarize content, instead of encouraging students to read full-texts. Curation exhibits the exact opposite of this instant manner, and as such is referred to as a strategy for promoting deep learning; the mere choice of topic by the curator motivates him internally, creates higher levels of engagement, encourages higher levels of inquiry and facilitates authentic learning (Bell 2010; Frerejean et al. 2019).

Technology in general and curation in particular are considered cultural game-changers. Consequently, this produces a curation product that is in fact an ontological entity (Gadot and Levin 2014). The essence of this transformation is beyond change in the nature of knowledge in itself; hence, it is considered as reflecting the nature of being.

Moreover, although the ontology is personal in nature, the curation process also includes social aspects. The social component of this continuing inquiry process is based on interaction with colleagues and constant updating of the body of knowledge. The collaborative aspect of the curation activity means that the process is based on reuse of information items created by other members of the knowledge community. Moreover, it is demonstrated by the discourse between members of the community, which includes reflections on personal or others' publications. Curators utilize self-reflection, including the influence of their personality on the choices they make as well as the expression of their reflections which accompany their exhibits (Thomas et al. 2018). This is manifested in the curators' activities; however, in the narratives there was more reference to personal reflections, and less to social aspects. This is a result of the complexity of the curation process, and indicates that the social component is less evident when the curators are considered novice, as opposed to experts.

The conceptual two-dimensional model presented in our study demonstrates the connection between curation and authentic learning in a way that allows to assess the curation process on multiple dimensions. In this sense it is a novel construct; moreover, it demonstrates the importance of the social aspect and its crucial role in both digital curation and authentic learning, portraying the complex nature of acquiring curation literacy.

This novel taxonomy shown in our model classifies activity patterns into 3 aspects: content, process and social activity patterns, and learning characteristics into 3 types: relevance, curator activities, and products. Curators act in a digital world that is relevant to their physical world, gathering updated and relevant information to their fields of interest. This is evident in the activity patterns of the curators and in their learning characteristics, as expressed in their narratives. The interdisciplinary aspects and the relevance to real world subjects referred to in the content rubric of our model were manifested in both quantitative and qualitative findings. The vague definition that characterizes authentic learning is reflected in the curator's need to self-define problems, thereby creating a personal ontology. The interdisciplinary nature of the topics and their multiple viewpoints require continuous inquiry and examining numerous resources in terms of types and origin; hence, this is an ongoing endeavor that reflects contemporary modes of lifelong learning.

A minority of the statements referred to the knowledge exhibitions themselves, e.g., the curation products. The topics were chosen freely according to curators' preferences, which is a critical principle of authentic learning (Flintoff et al. 2014). When examining the knowledge exhibitions, we see that there are no two curators that their knowledge exhibitions are identical, even when the subject is the same: each curator chooses sources, information items and different media items, and the products reflect his or her personality characteristic as well as activity styles and the choices of related communities.

Curators' activities were quite frequent in the narratives. In authentic learning the learners choose the sources as well as the inquiry directions on their own. This requires selecting and filtering of high quality and relevant information items (Poole 2015). However, the success of authentic learning does not depend on the curator alone, but also on collaboration with others. This is typical and one of the main characteristics of social curation: reuse of items created by others whilst communicating with peers in knowledge communities, and not only usage of original materials (Dabbagh and Kitsantas 2012). Our study shows that this pattern of reuse of information items is typical of novice curators, who are still unconfident in their ability to create information items and tend to search for others' creations. For this reason, curation is vital in teacher education, but requires practice in order to achieve expertise.

6 Study Limitations

In our study we used students' reflections at the end of the semester, in order to achieve a retrospective viewpoint; however, a prolonged process of writing these reflections, from the beginning of the semester, may produce additional data. Also, due to the novelty of curation implementation in preservice education, students were offered to work in pairs. Consequently, some data regarding the learning experience that occurred during the curation activity may have been lost. Hence, we encourage future research to be conducted over a multi-year period, in order to allow better implementation of curation in preservice training. Also, we encourage research of teacher training that includes students who have experienced an additional advanced course in social digital curation, and also have experienced this process in their practice.

7 Conclusions and Implications

Implications of our research are threefold: for theory, methodology and pedagogical practice. The model presented in our study should be further examined, focusing on the notion of the "novice curator" status. A follow-up longitudinal study may include introduction of the model in the first year of preservice training and used over time, thereafter examining the development in their curation literacy. This may contribute to further developing theoretical as well as methodological aspects.

Curation is in itself a learning venture that requires skills and competencies. The skills required from a graduate of the twenty-first century education system is evident in all aspects of the curation process and product. The evaluation of a knowledge exhibition is accomplished through social activity that utilizes crowd wisdom, or crowdsourcing (Llorente and Morant 2015). Curation contributes to the improvement of the curators' knowledge and skill acquisition, formally and informally, intentionally and unintentionally. Using social curation by preservice teachers can transform learning, however, surprisingly this form of learning is unknown and unused to its fullest capacity in educational settings.

Relevance and curator activities are at the heart of the learning process taking place when constructing an ontology of a knowledge domain by creating a knowledge exhibition using social digital curation. The knowledge construction process and learner experiences during the learning process (Johnson 2014; Moreillon 2015) may influence the way in which knowledge and skills are acquired to empower the learning itself, thereby transforming pedagogical practices. Indeed, participants experienced learning through digital curation as a meaningful learning process that is relevant for their learning as present preservice teachers and future educators. They perceived the curation as an authentic learning process suitable for teaching their students of all ages, being in line with their educational beliefs. Hence, this mode of learning should be implemented in teacher education, both in preservice and in-service training (Twinning et al. 2013).

Furthermore, the preservice training system that strives to train future teachers of the 21st century needs to teach digital curation skills by identifying and utilizing relevant curriculum-related resources (Deschaine and Sharma 2015). The trend for personalization in education (Thompson 2018) can facilitate digital curation in which the curator constructs his personal ontology. Joint efforts in research and development, and furthermore, implementation, may allow curation to reach its fullest potential.

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